Engineering Department

DATE: April 19, 2022

FROM: Gabe Schell, City Engineer

ITEM: State Street Safety Project – HC 133

REQUEST:
Receive presentation on proposed State Street Safety and Preventative Maintenance Project and provide comments to North Dakota Department of Transportation (NDDOT) on preferred alternatives.

Please place this item on the April 26, 2022, City Commission meeting agenda.

BACKGROUND INFORMATION:
The NDDOT is programming a safety and preventative maintenance project on State Street between Divide Avenue and Calgary Avenue. The purpose of the project is to improve traffic operations and safety within the corridor and preserve and correct deficiencies in the pavement structure. The project is scheduled for a 2022 bid letting and 2023 construction. NDDOT's consultant will present the project to the Board and a representative from NDDOT will be available for questions at the meeting. A general description of the project alternatives is provided below.

Alternative A – No Build
Alternative B – Turn lane improvements, intersection access modifications, traffic signal system replacement and pedestrian accessible ramp replacement/construction.
Alternative C – Similar improvements as Alternative B but left turns from State Street at Divide Avenue, Capitol Avenue and Century Avenue would be restricted and redirected to signalized median U-turn locations upstream and downstream of the main intersection.

In addition to the programmed safety improvements, the following alternatives can be selected to perform concrete pavement repair and bridge structure repair as part of this project.
Alternative D – Concrete pavement repair south of I-94 Exit 159.
Alternative E – Concrete pavement repair north of I-94 Exit 159.

Public input has included solicitation of views letters sent to local, state and federal agencies; business owner meetings held in November 2021; public input meeting held in December 2021 and individual property owner outreach occurring throughout the project. The full NDDOT public input presentation can be found at the following link. Additional materials prepared for the public input meeting can be found at the following link.

Enclosed with this agenda memo is the draft documented CATEX prepared by NDDOT's consultant. This document details the project and its alternatives and options. I have placed my recommendations for project alternatives and options within the document and will seek confirmation of the Board. NDDOT would take the City's comments into consideration as part of their decision making process.

RECOMMENDED CITY COMMISSION ACTION:
Receive presentation and provide recommendations to NDDOT on preferred alternative(s).

STAFF CONTACT INFORMATION:
Gabe Schell, PE | City Engineer, 355-1505 or gschell@bismarcknd.gov

DRAFT DOCUMENTED CATEX

SAFETY IMPROVEMENTS & PREVENTATIVE MAINTENANCE

Project No.	PCN
SHE-1-083(118)901	20097
NHU-IM-1-083(133)901	22769

From Divide Avenue to EB Ramps of I-94

SHE-1-083(119)088	20098
NHU-IM-1-083(134)088	22770

From WB Ramps I-94 to Calgary Avenue

Prepared by

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
BISMARCK, NORTH DAKOTA

http://www.dot.nd.gov/

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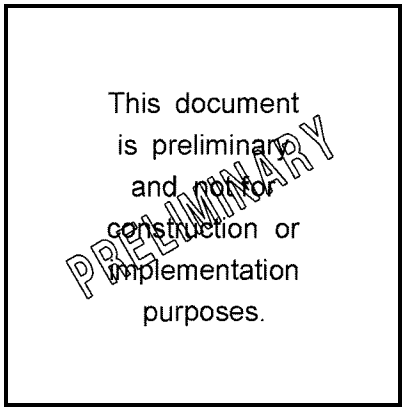
Environmental Reviewer: Alexis Wanek, NDDOT ETS Division
May 2022

SAFETY IMPROVEMENTS & PREVENTATIVE MAINTENANCE

BISMARCK, NORTH DAKOTA

CERTIFICATION



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Scoping Report
Public Involvement Report
Aquatic Resources Delineation Report
Traffic Operations Report
Cultural Resources Report

A. Project Description

Highway: US Highway 83 Business from Divide Avenue to I-94
US Highway 83 from I-94 to Calgary Avenue
District: Bismarck
Limits: South of Divide Avenue to Calgary Avenue

Associated Project PCN(s) and Description(s):
PCN 20097 – Turn Lanes and Signals, Divide Avenue to I-94 Eastbound Ramps
PCN 22769 – Concrete Pavement & Structure Repair, Divide Avenue to I-94 EB Ramps
PCN 20098 – Turn Lanes and Signals, I-94 Westbound Ramps to Calgary Avenue
PCN 22770 – Concrete Pavement & Structure Repair, I-94 WB Ramps to Calgary Avenue

Figure 1 – Project Location Map

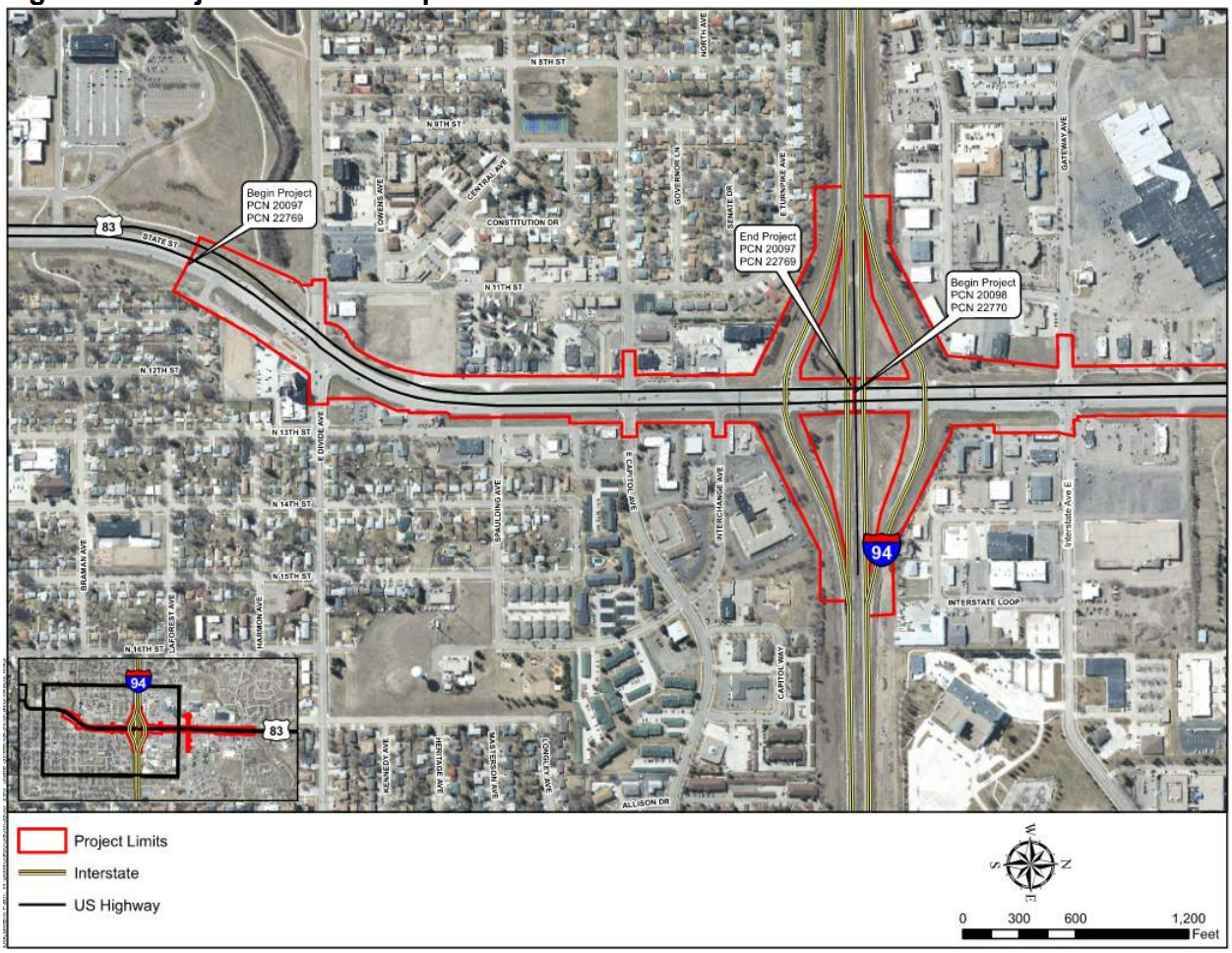


Figure 2 – Project Location Map

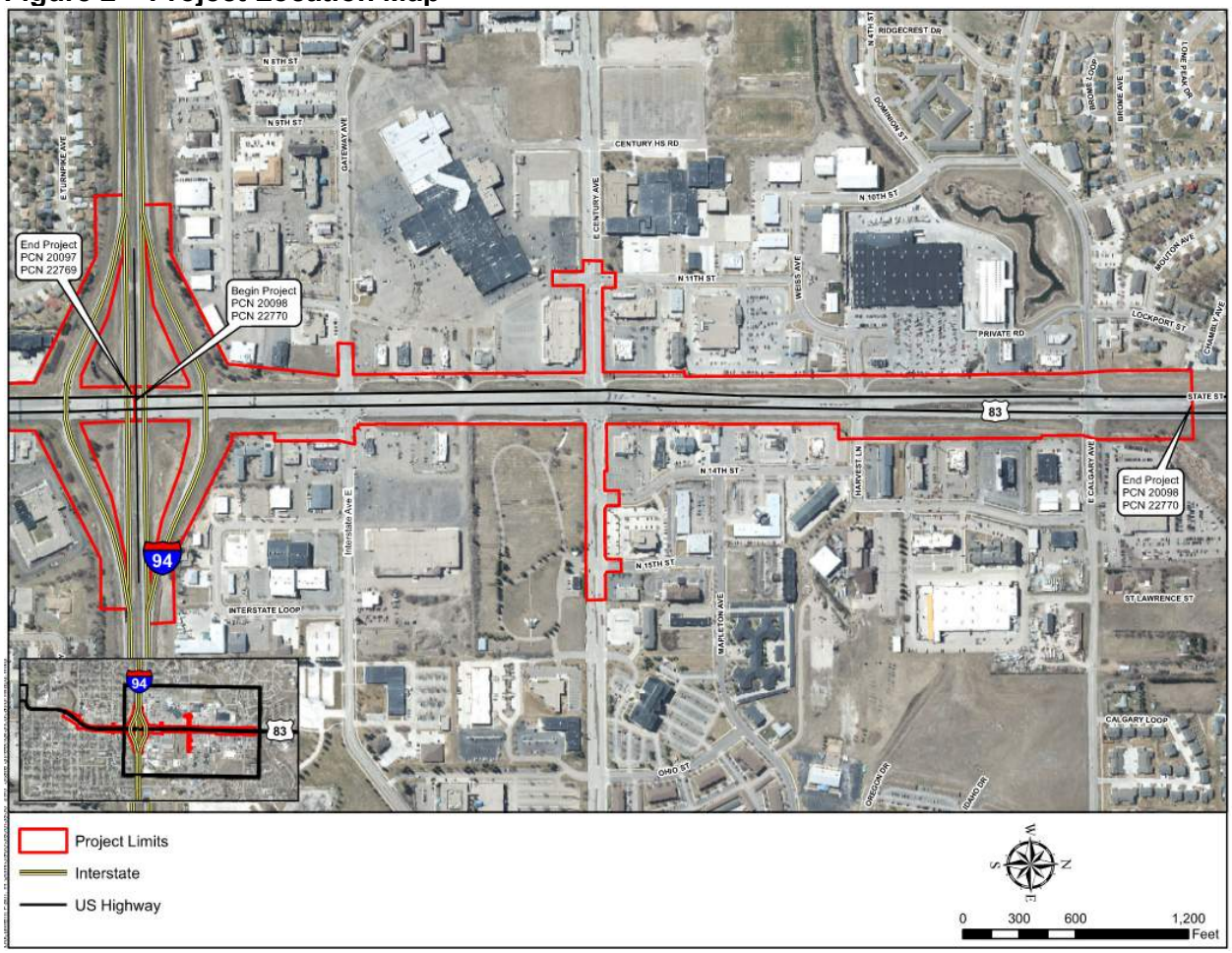


Table 1 - Traffic Data

	Year	Location	Passengers	Trucks	Totals
Current	2019	East Divide Ave to Spaulding Ave	29,255	325	29,580
		Spaulding Ave to East Capitol Ave	30,105	335	30,440
		East Capitol Ave to East Interchange Ave	31,665	370	32,035
		East Interchange Ave to I-94 EB Ramps	33,960	415	34,375
		I-94 EB Ramps to I-94 WB Ramps	36,505	655	37,160
		I-94 WB Ramps to Interstate Ave	39,560	890	40,450
		Interstate Ave to Gateway Mall/K-Mart	32,580	760	33,340
		Gateway Mall/K-Mart to East Century Ave	33,540	780	34,320
		East Century Ave to Weiss Ave/Harvest Ln	28,195	690	28,885
		Weiss Ave/Harvest Ln to East Calgary Ave	25,640	660	26,300
Forecast	2039	East Divide Ave to Spaulding Ave	35,700	395	36,095
		Spaulding Ave to East Capitol Ave	36,735	410	37,145
		East Capitol Ave to East Interchange Ave	38,640	450	39,090
		East Interchange Ave to I-94 EB Ramps	41,440	505	41,945
		I-94 EB Ramps to I-94 WB Ramps	44,540	800	45,340
		I-94 WB Ramps to Interstate Ave	51,225	1,150	52,375
		Interstate Ave to Gateway Mall/K-Mart	42,180	985	43,165
		Gateway Mall/K-Mart to East Century Ave	43,425	1,010	44,435
		East Century Ave to Weiss Ave/Harvest Ln	36,505	895	37,400
		Weiss Ave/Harvest Ln to East Calgary Ave	33,195	855	34,050

B. Project Schedule

Project Nos.: SHE-1-083(118)901, NHU-IM-1-083(133)901,
SHE-1-083(119)088, and NHU-IM-1-083(134)088
Plans Complete: August 19, 2022
Bid Opening: October 14, 2022

C. Purpose of Project

The purpose of the project is to improve traffic operations at intersections along State Street from Divide Avenue to Calgary Avenue and protect the pavement structure by slowing the rate of pavement deterioration and correct deficiencies in the pavement surface.

D. Need for Project

With existing and future intersection level of service (LOS) deteriorating to levels below minimum standards, intersection improvements are proposed to improve traffic operations. In addition, traffic demand has resulted in deteriorating pavement conditions, requiring repair to slow the deterioration of the concrete pavement and correct deficiencies.

Existing Conditions:

The segment of State Street (US 83) within the project limits is on the NDDOT Urban Regional System and is currently a 40 mph, predominantly six-lane divided urban roadway with various right and left turn lane configurations and is classified as a Principal Arterial per the 2016 Functional Classification map. The segment south of Interstate 94 is on the Secondary Regional System with the segment north of Interstate 94 on the Primary Regional System, as classified on the 2016 Urban Road System Map. There are several classified streets that intersect with State Street within the project corridor. These intersections include Divide Avenue (Minor Arterial), Capitol Avenue (Collector), Interstate 94 EB Ramps (Interstate), Interstate 94 WB Ramps (Interstate), Interstate Avenue (Collector), Century Avenue (Principal Arterial), Weiss Avenue (Collector), and Calgary Avenue (Collector). All classified streets are signalized intersections. All other intersections are stop-controlled on the approach street.

There are 12 access points within the project corridor:

- Divide Avenue (signalized)
- West Frontage Road/Business Access (full access, approach road stop-control)
- West Frontage Road/Spaulding Avenue (full access, approach road stop-control)
- Capitol Avenue (signalized)
- Interchange Avenue/N 12th Street Access (full access, approach road stop-control)
- Interstate 94 EB Ramps (signalized)
- Interstate 94 WB Ramps (signalized)
- Interstate Avenue (signalized)
- Gateway Mall/K-Mart Access (three-quarter access, approach road right-in/right-out with stop-control)
- Century Avenue (signalized)
- Weiss Avenue/Harvest Lane (signalized)
- Calgary Avenue (signalized)

From January 1, 2017 to December 31, 2019, there was 529 intersection crashes within the project corridor. Four locations are on the 2017-2019 Urban High Crash Location (HCL) list. The list below indicates Location, HCL Rank, and Total Crashes.

- Century Avenue, 3rd, 110
- Interstate Avenue, 7th, 89
- Divide Avenue, 18th, 72
- Interstate 94 EB Ramps, 22nd, 44

Analysis of the data indicates 41% of crashes occurred during non-dry conditions and 55% of the crashes have been rear-end collisions, a typical collision type found along a signalized corridor. 75% of the crashes were property damage only with the remaining crashes involving injuries. There was one fatality within the project corridor during the study period.

The existing State Street project corridor capacity analysis was performed and documented in the Traffic Operations Study, dated June 2020. For AM peak hour traffic, all signalized intersections operate with an Intersection LOS C or better. During the PM peak hour traffic, all signalized intersections operate with an Intersection LOS C or better, excluding Century Avenue intersection (LOS D) and Divide Avenue intersection (LOS E).

LOS is defined as a system of ranking performance using average stop delay per vehicle. Acceptable levels of service are considered LOS D or better. See Table 2 for description of LOS values.

Table 2 – Capacity Level of Services (LOS) Descriptions

LOS	Average Delay (sec/veh)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

Values from 2016 Highway Capacity Manual Exhibit 19-8 and 20-2

The capacity analysis included evaluation of the peak hour turning movement volumes at all intersecting roadways for the AM and PM peak hour. Though the analysis found the existing signalized intersections provide an acceptable LOS, excluding intersections previously noted, there are significant delays at several signalized and non-signalized traffic movements and approach roadways. Table 4 provides a summary of the existing LOS for each intersection within the project corridor. The LOS noted in Table 4 is based on the worst approach within the intersection. Refer to the Traffic Operations Study, dated June 2020 and Traffic Operations Study Addendum #1, dated December 2020 for in-depth details regarding the State Street Traffic Operations capacity analysis results regarding existing and forecasted conditions.

Table 3 – Existing State Street Intersections Level of Services (LOS)

Intersection		Level of Service (LOS)					
Control	Location	Overall		Mainline State Street		Approach Roadway	
		AM	PM	AM	PM	AM	PM
Signalized	Divide Ave	C	E	C	E	E	F
Thru-Stop	Spaulding Ave	-	-	A	B	C	D
Signalized	Capitol Ave	B	C	B	C	E	E
Thru-Stop	Interchange Ave	-	-	A	A	F	F
Signalized	I-94 EB Ramps	B	C	C	C	C	D
Signalized	I-94 WB Ramps	B	B	B	B	E	D
Signalized	Interstate Ave	B	C	B	C	C	D
3/4 - Stop	Gateway Mall/K-Mart	-	-	A	A	A	A
Signalized	Century Ave	C	D	C	C	D	D
Signalized	Weiss Ave/Harvest Ln	A	C	A	C	D	D
Signalized	Calgary Ave	B	C	B	C	C	D

Values noted above are an average rating for the location. Individual values for specific turning movements may be lower.

The State Street project corridor right-of-way (ROW) varies between intersections along the corridor. From Divide Avenue to Interstate 94 the ROW varies from 205 feet to 255 feet. Between Interstate Avenue and Calgary Avenue the ROW varies from 250 feet to 340 feet. The existing urban roadway is constructed with three 12-foot-wide driving lanes in each of the northbound and southbound directions, concrete curb and gutter, and 12-foot-wide left and right turn lanes divided by either raised concrete or landscaped medians.

The typical pavement section consists of 8” (Divide Avenue to Interstate 94) and 10” (Interstate 94 to Calgary Avenue) non-reinforced doweled concrete pavement with 24” of blended aggregate base course. See **Figure 3** for the existing typical section.

Figure 3 – Existing Typical Section

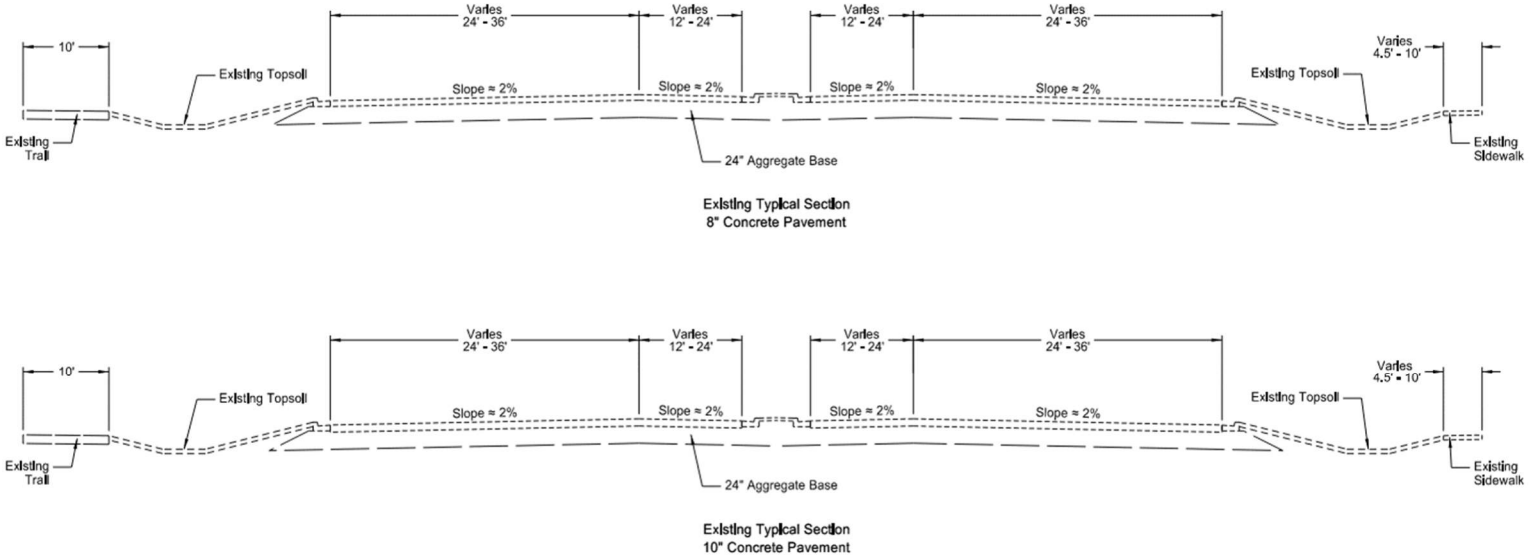


Table 4 denotes locations of existing auxiliary lanes along State Street

Table 4 – Existing State Street Auxiliary Lanes

Intersection	Southbound		Northbound	
	Left Turn Lane	Right Turn Lane	Left Turn Lane	Right Turn Lane
Divide Avenue	X		X	
West Frontage Road	X		X	
Spaulding Avenue	X		X	
Capitol Avenue	X		X	
Interchange Avenue	X		X	
Interstate 94 EB Ramps	X			X
Interstate 94 WB Ramps		X	X	
Interstate Avenue	X (2)	X	X (2)	X
Gateway Mall / K-Mart Access	X		X	
Century Avenue	X (2)	X	X (2)	X
Weiss Avenue / Harvest Lane	X	X	X	
Calgary Avenue	X		X	X

Construction History and Conditions:
The following summarizes the construction history of State Street, within the project corridor:

- Reconstructed and widened to three lanes in each direction with divided median in 2002 from Boulevard Avenue to Interstate 94 and in 2003 from Interstate 94 to Calgary Avenue.
- Traffic signal poles, mast arms, and controller cabinets were replaced as part of the reconstruction.
    - 2007 - Video detection equipment updated but is no longer supported by the manufacturer.
    - 2016 - Controllers were updated but have had significant number of failures and no longer warrantied by the manufacturer.
    - 2016 - Ultrasonic testing of the traffic signal standards showed several standards with pole wall thicknesses less than 50 percent of the original material thickness.
- Concrete pavement repair project completed in 2012 along segment from Interstate 94 to Calgary Avenue.
- Pedestrian facilities include a 10-foot-wide bituminous multi-use trail along the western right-of-way from Divide Avenue to Calgary Avenue in addition to a concrete sidewalk from Interstate Avenue to Century Avenue along the eastern right-of-way.
    - Most intersections include sidewalk connectivity from the multi-use trail to sidewalks along the approach streets.
- Drainage is collected by two types of systems, storm sewer pipe and inlets and roadway ditches and culvert pipe.
    - The pavement surface drainage is collected via curb and gutter directing flow to curb inlets. The curb inlets drain via pipes to either the adjacent ditch section or to the municipal storm sewer pipe system.
    - Divide Avenue to Interstate 94 drains primarily via ditches conveying runoff from storm sewer pipes and culverts, ultimately discharging into an energy dissipator structure at the southwest corner of the Divide Avenue intersection.

    - Interstate 94 to Capitol Avenue drains primarily via a traditional storm sewer system conveying runoff from curb inlets and area drains, ultimately discharging into the Capitol Street storm sewer trunk system.
    - Capitol Avenue to Calgary Avenue drains primarily via ditches conveying runoff from storm sewer pipes and culverts, ultimately discharging into a wetland area near the northeast corner of the Calgary Avenue intersection.
    - A localized hydraulic analysis would be completed during final design. The analysis would be limited to review of the structure improvements or relocations and would not include a detailed analysis of the existing storm sewer system.
- Existing utilities identified within the project limits include:
    - Underground municipal water, sanitary, and storm sewer.
    - Underground fiber optic, electric, natural gas, and television.
    - Overhead high voltage transmission line crossing (Century Avenue).
    - Existing utilities parallel State Street within the west and east ditches.
    - Approximately 41 utility crossings exist across State Street, with a majority located at the intersections and run parallel with approach streets.
- Current pavement condition assessment is noted below. Values based on the International Roughness Index (IRI):
    - IRI: 149 in/mi (poor) – Divide Avenue to I-94
    - IRI: 139 in/mi (poor) – I-94 to Calgary Avenue - Northbound
    - IRI: 138 in/mi (poor) – I-94 to Calgary Avenue - Southbound

Deficiencies:

- Mainline turn lanes do not satisfy volume criteria.
- Several intersection approach LOS forecasted to be lower than LOS D.
- Traffic signal standards are deteriorating, and equipment is nearing or past its useful service life.
- Random pavement deterioration

E. Scope of Work

2022-2025 STIP:

PCN	Total	Federal	State	Local
20097	$2,800,000	$2,520,000	$140,000	$140,000
20098	$2,500,000	$2,225,000	$250,000	
22769	$ 816,000	$ 660,000	$ 74,000	$ 82,000
22770	$2,310,000	$1,869,000	$441,000	

2019 Scoping Report:

Combined PCNs	Total
	$5,516,702

2022 Documented CATEX:

PCN	Total	Federal	State	Local
20097	$2,885,816 to $4,457,159	$2,597,234 to $4,011,443	$141,291 to $222,858	$141,291 to $222,858
20098	$3,582,396 to $5,007,272	$3,224,156 to $4,506,545	$358,240 to $500,727	$ 0
22769	$ 460,000	$ 372,278	$ 41,722	$ 46,000
22770	$ 335,000	$ 271,116	$ 63,884	$ 0

F. Description of Alternatives

Project Nos. SHE-1-083(118)901, PCN 20097; NHU-IM-1-083(133)901, PCN 22769
SHE-1-083(119)088, PCN 20098; NHU-IM-1-083(134)088, PCN 22770

a. Alternative A: No Build

The No-Build Alternative would provide no improvements to the current condition of the corridor and does not meet the purpose and need of the project.

The probable cost to construct Alternative A is $0.

Project No. SHE-1-083(118)901, PCN 20097

b. Alternative B (South Segment): Traditional Turn Lane Modifications
Divide Avenue, Spaulding Avenue, Capitol Avenue, Interchange Avenue, and I-94 EB & WB Ramps

This Alternative would improve turning movements from Divide Avenue north to Interchange Avenue by restriping existing lanes, extending existing turn lanes and constructing new turn lanes.

The existing storm sewer will be impacted throughout the corridor due to the turn lane modifications. The project will maintain existing drainage patterns by removing and replacing the catch basins, extending existing storm sewer as needed and reestablishing the outlet pipes. No additional storm sewer improvements are proposed as part of the project.

The existing traffic signal systems will also be replaced. For all existing signalized intersections, traffic signal system replacements will include new signal poles, accessible pedestrian signals (APS), and controller cabinets and will include added signal heads, signal head backplates, red light confirmation, additional signal timing plans, and system control.

Improvements included with this Alternative are summarized below by each intersection.

Divide Avenue:

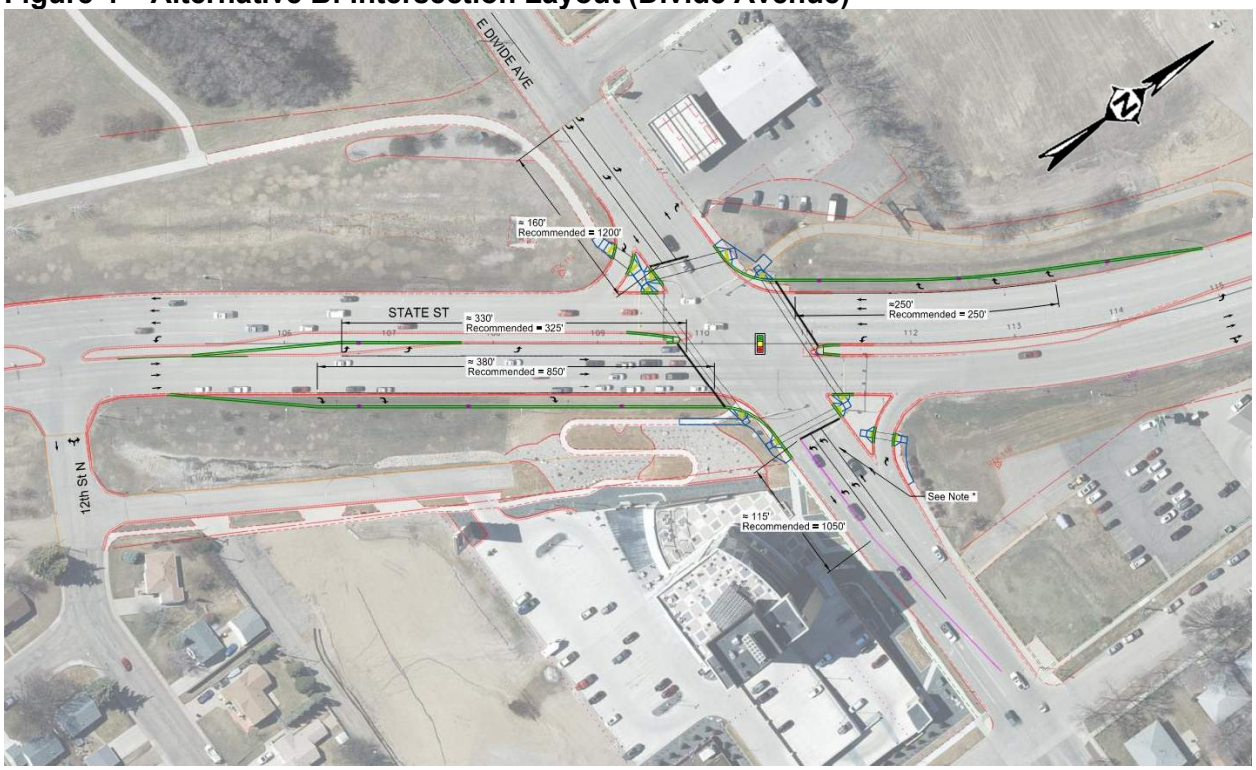
At this intersection, turn lane improvements include (see **Figure 4**):

- Construction of a 380’ northbound right turn lane.
- Extension of northbound left turn lane from 220’ to 330’.
- Construction of a 250’ southbound right turn lane.
- Restripe second Divide Avenue eastbound thru lane for dual eastbound left turn and dual westbound left turn lanes. The dual eastbound left turn lanes will be 160’ in length and the dual westbound left turn lanes will be 115’ in length.

Pedestrian ramps will also be constructed in all four quadrants of the intersection meeting American’s with Disability Act (ADA) requirements. The existing signal system will be replaced.

With these improvements, the projected 2039 PM Peak intersection LOS would be LOS F.

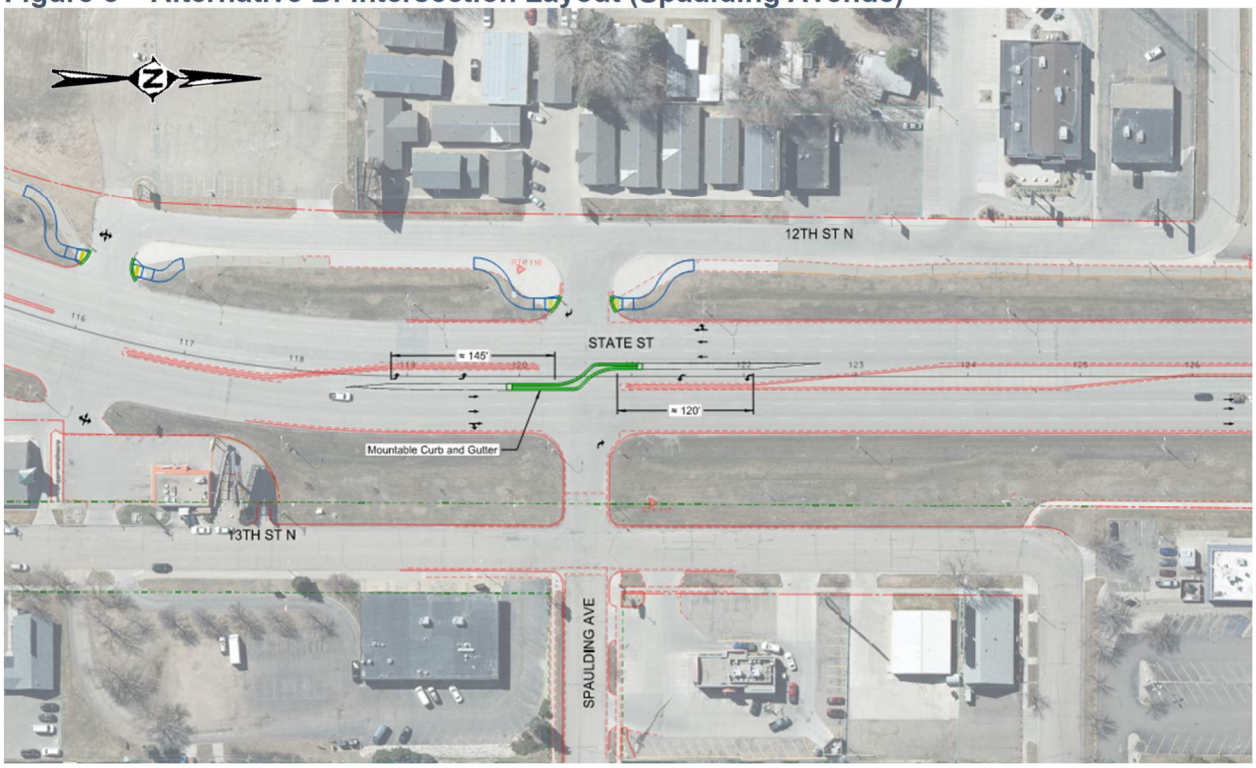
Figure 4 – Alternative B: Intersection Layout (Divide Avenue)



Spaulding Avenue:

The intersection would be improved by incorporating a 3/4 Access restricting left turn and through movements from Spaulding Avenue. This will be accomplished by constructing a raised median utilizing mountable curb and gutter within the intersection permitting northbound and southbound left turn movements only. Mountable curb and gutter will be implemented to allow limited through access for the transport of modular homes. Existing pedestrian ramps in the southwest and northwest quadrants of the intersection will be constructed meeting ADA compliance. See **Figure 5.**

Figure 5 – Alternative B: Intersection Layout (Spaulding Avenue)



Capitol Avenue:

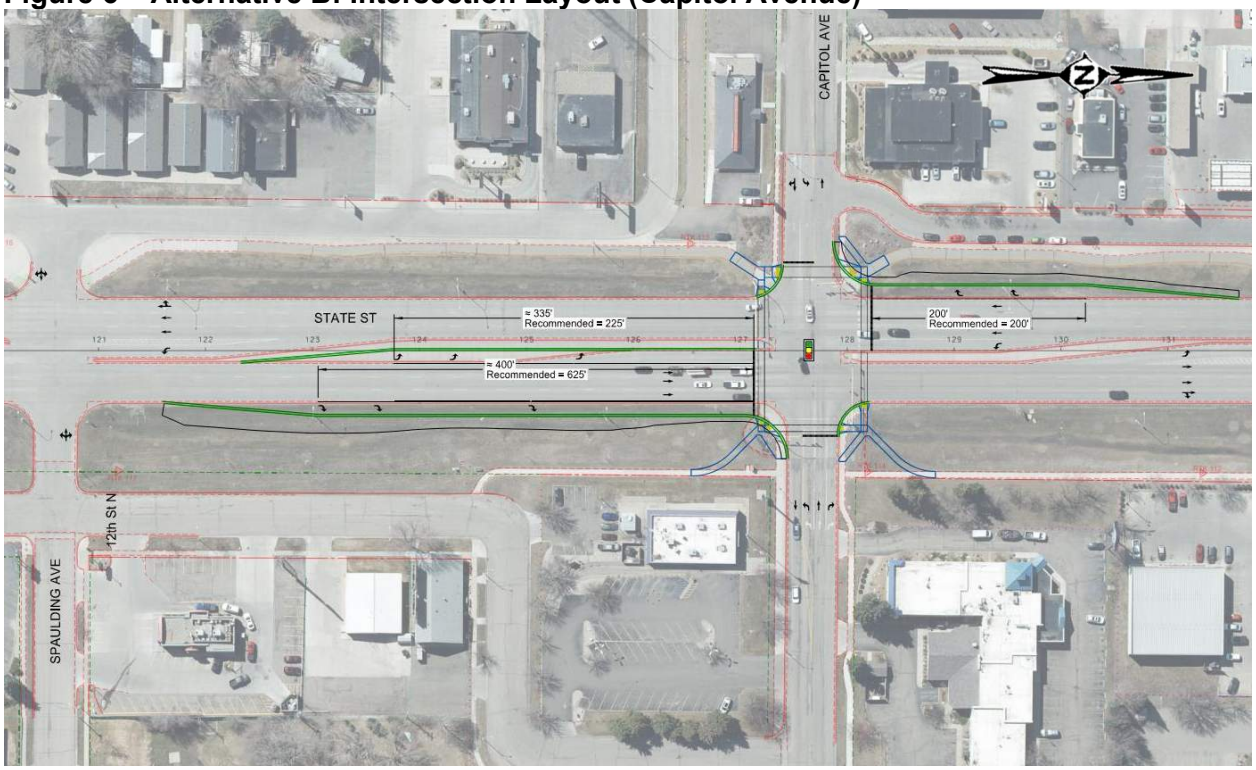
This Alternative would include the following turn lane improvements (see **Figure 6**):

- Construction of a 400' northbound right turn lane
- Extension of northbound left turn lane from 120' to 335'.
- Construction of a 200' southbound right turn lane.

The existing pedestrian ramps in all four quadrants of the intersection will be constructed to maintain ADA accessibility for east/west and north/south pedestrian movements. The existing traffic signal system will also be replaced.

These improvements are anticipated to operate at an intersection LOS E during the 2039 PM Peak projection.

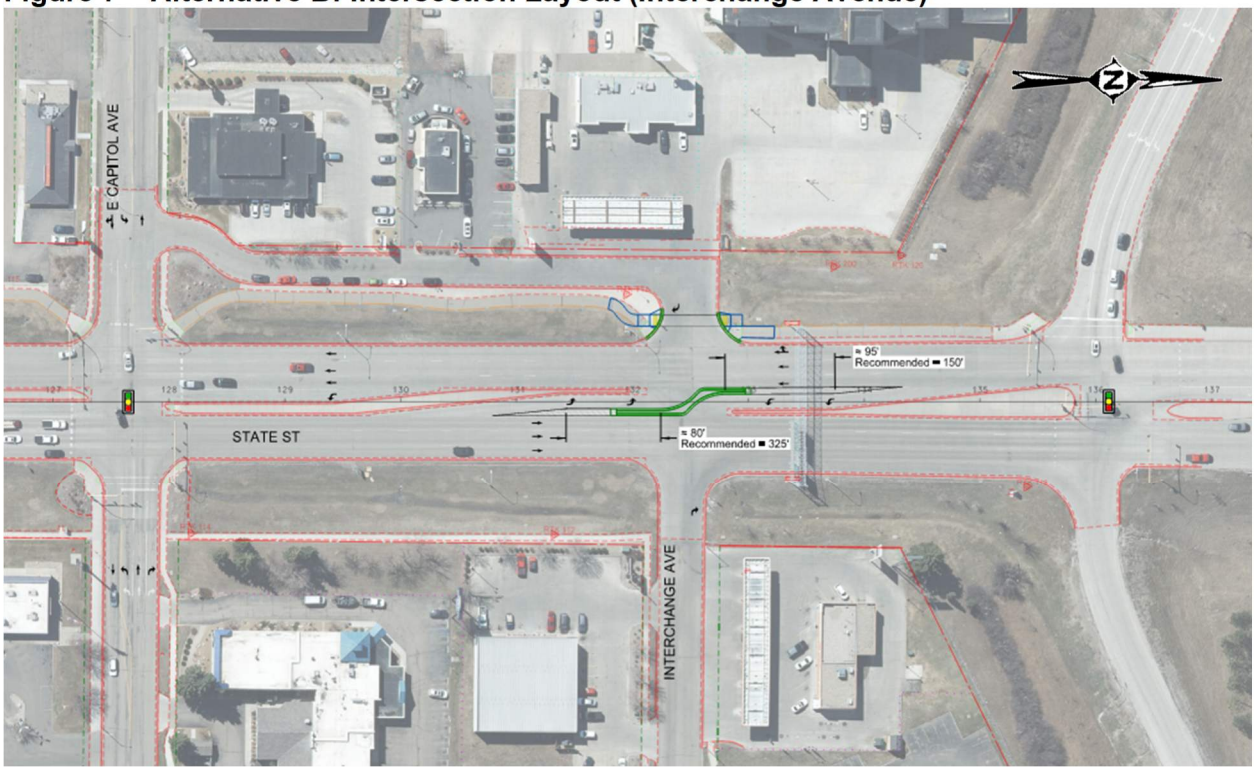
Figure 6 – Alternative B: Intersection Layout (Capitol Avenue)



Interchange Avenue:

At this location, the intersection would be revised to a 3/4 Access restricting left turn and thru movements from Interchange Avenue. This will be accomplished by constructing a raised median utilizing standard curb and gutter within the intersection permitting northbound and southbound left turn movements only. Existing pedestrian ramps in the southwest and northwest quadrants of the intersection will be constructed meeting ADA compliance. See **Figure 7**.

Figure 7 – Alternative B: Intersection Layout (Interchange Avenue)



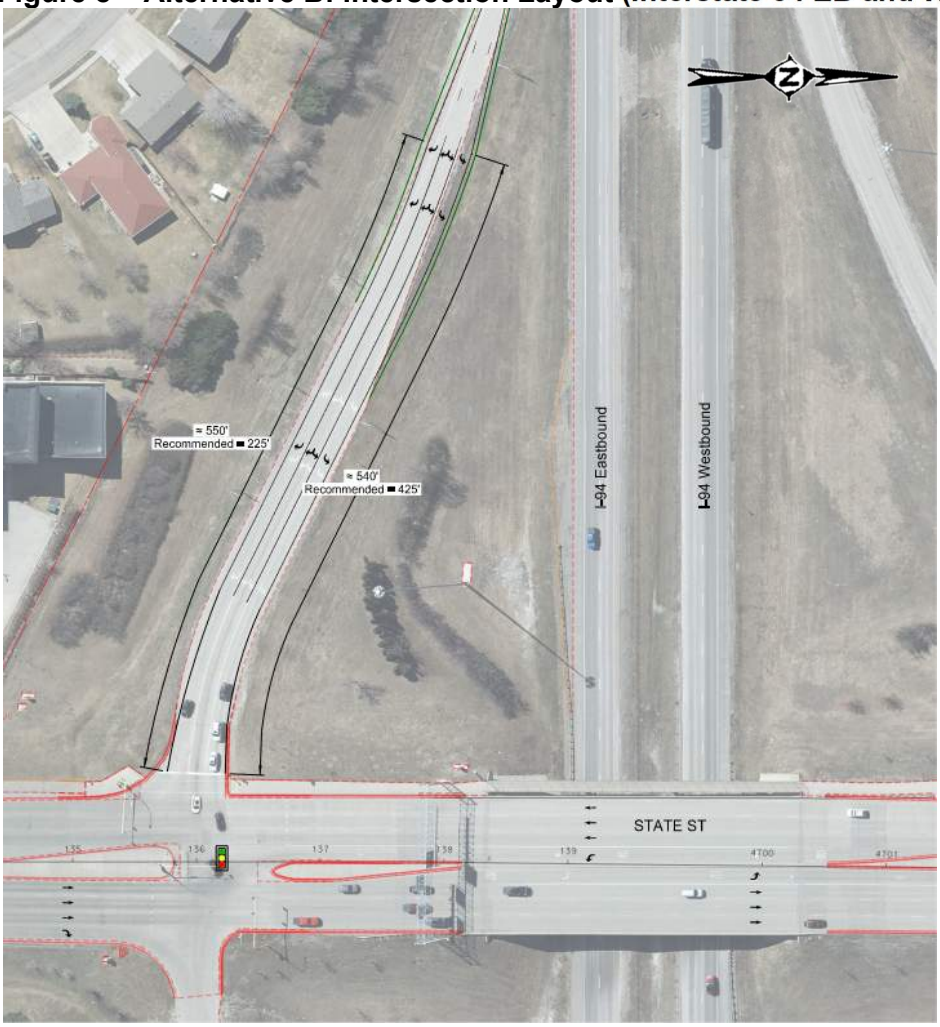
I-94 EB Off-Ramp Lane Extension and WB Off-Ramp Intersections:

At this location, the following improvements are proposed at the Interstate 94 Eastbound Ramps.

- Extension of eastbound I-94 offramp right turn lane to 550'.
- Extension of eastbound I-94 offramp left turn lane to 540'.

The existing pedestrian ramps in the southwest and northwest quadrants of the intersection will be constructed to maintain ADA accessibility for north/south pedestrian movements. The existing traffic signal systems at the EB Off-Ramp and WB Off-Ramp will also be replaced. See **Figure 8**.

Figure 8 – Alternative B: Intersection Layout (Interstate 94 EB and WB Ramps)



The probable cost to construct Alternative B (South Segment) is $2,885,816.

c. Alternative B (North Segment): Traditional Turn Lane Modifications
Interstate Avenue, Century Avenue, Weiss Avenue/Harvest Lane, and Calgary Avenue

This Alternative would improve turning movements from Interstate Avenue north to Calgary Avenue by restriping existing lanes, extending existing turn lanes and constructing new turn lanes.

The existing storm sewer will be impacted throughout the corridor due to the turn lane modifications. The project will maintain existing drainage patterns by removing and replacing the catch basins, extending existing storm sewer as needed and reestablishing the outlet pipes. No additional storm sewer improvements are proposed as part of the project.

The existing traffic signal systems will also be replaced. For all existing signalized intersections, traffic signal system replacements will include new signal poles, accessible pedestrian signals (APS), and controller cabinets and will include added signal heads, signal head backplates, red light confirmation, additional signal timing plans, and system control.

Improvements included with this Alternative are summarized below by each intersection.

Interstate Avenue – Base Alternative:

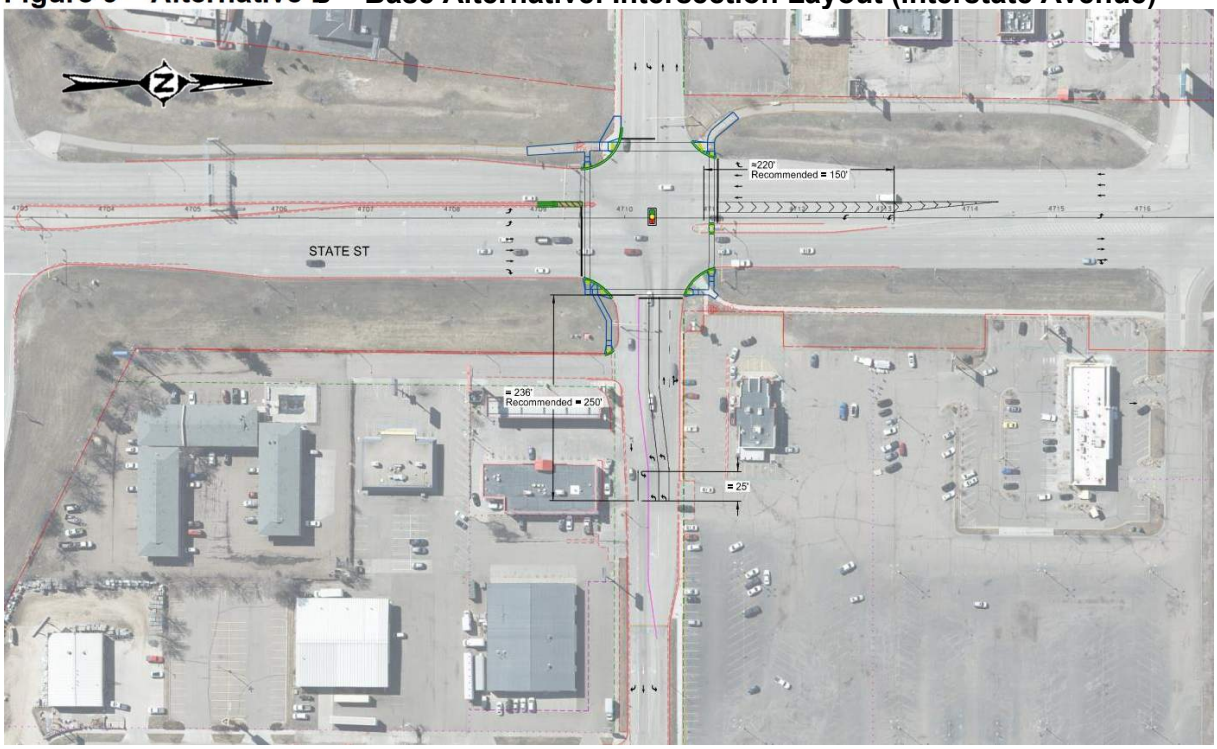
This alternative would construct the following improvements at Interstate Avenue (see **Figure 9**):

- Restripe existing dual southbound left turn lane to a 220' long single southbound left turn lane.
- Restripe the east approach of Interstate Ave to consist of a single eastbound thru lane, 25’ long eastbound left turn lane at the north driveway, dual 236’ long westbound left turn lanes and two westbound thru lanes.
- Restripe the west approach of Interstate Ave to incorporate a dedicated right turn lane.

The existing pedestrian ramps in all four quadrants of the intersection will be constructed to maintain ADA accessibility for east/west and north/south pedestrian movements. The existing traffic signal system will also be replaced.

These improvements are anticipated to operate at an intersection LOS C during the 2039 PM Peak projection.

Figure 9 – Alternative B – Base Alternative: Intersection Layout (Interstate Avenue)



Interstate Avenue – Option 1a:

This alternative would include improvements similar to the Base Alternative, except the following notable differences (see **Figure 10)**:

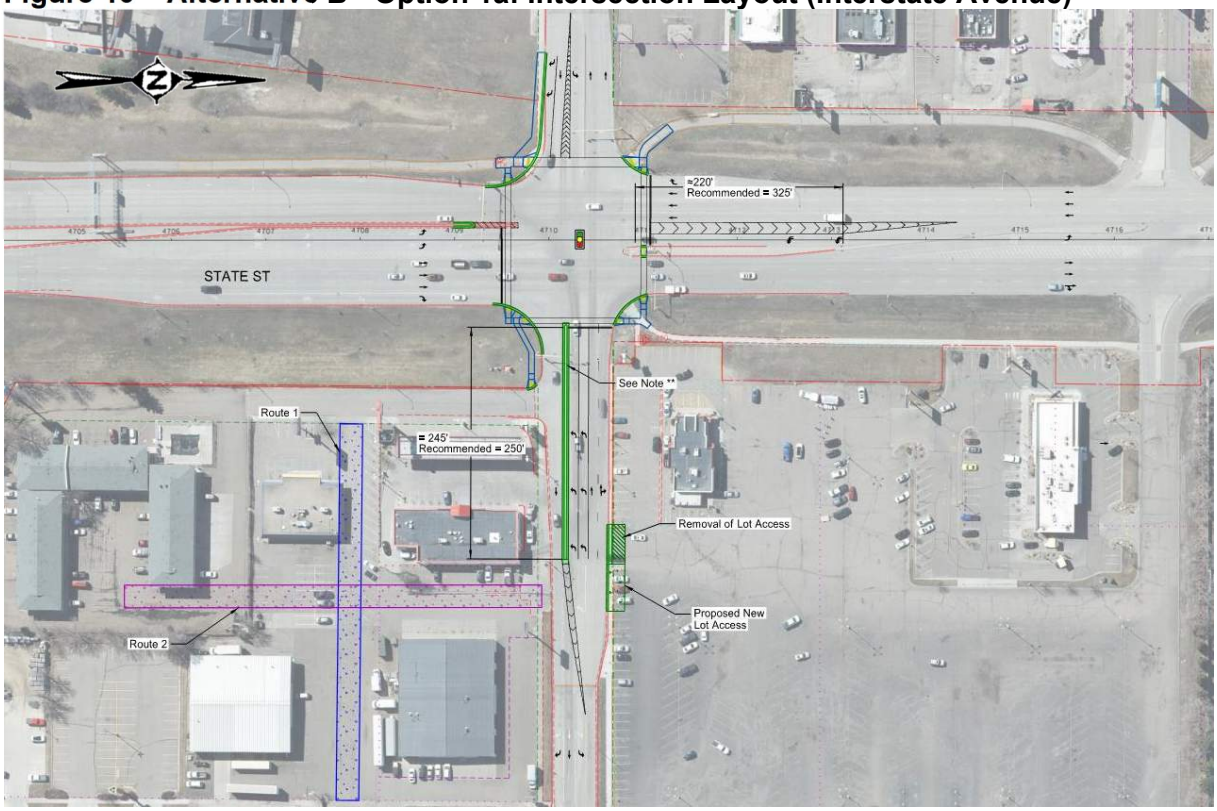
- Install a raised median between the eastbound thru lane and the dual westbound left turn lanes restricting left turn movements into and out of the Simonson Gas Station and Arby's.

By incorporating the raised median, several conflict points associated with the left turn movements at the frontage road, Simonson Gas Station and Arby's would be eliminated. However, access to these parcels would be modified. This option would also reduce the lane widths to 11' along Interstate Avenue.

These improvements are anticipated to operate at an intersection LOS C during the 2039 PM Peak projection.

The additional cost for Option 1a improvements is $116,145.

Figure 10 – Alternative B - Option 1a: Intersection Layout (Interstate Avenue)



Century Avenue – Base Alternative:

This alternative would include the following improvements at Century Avenue (see **Figure 11)**:

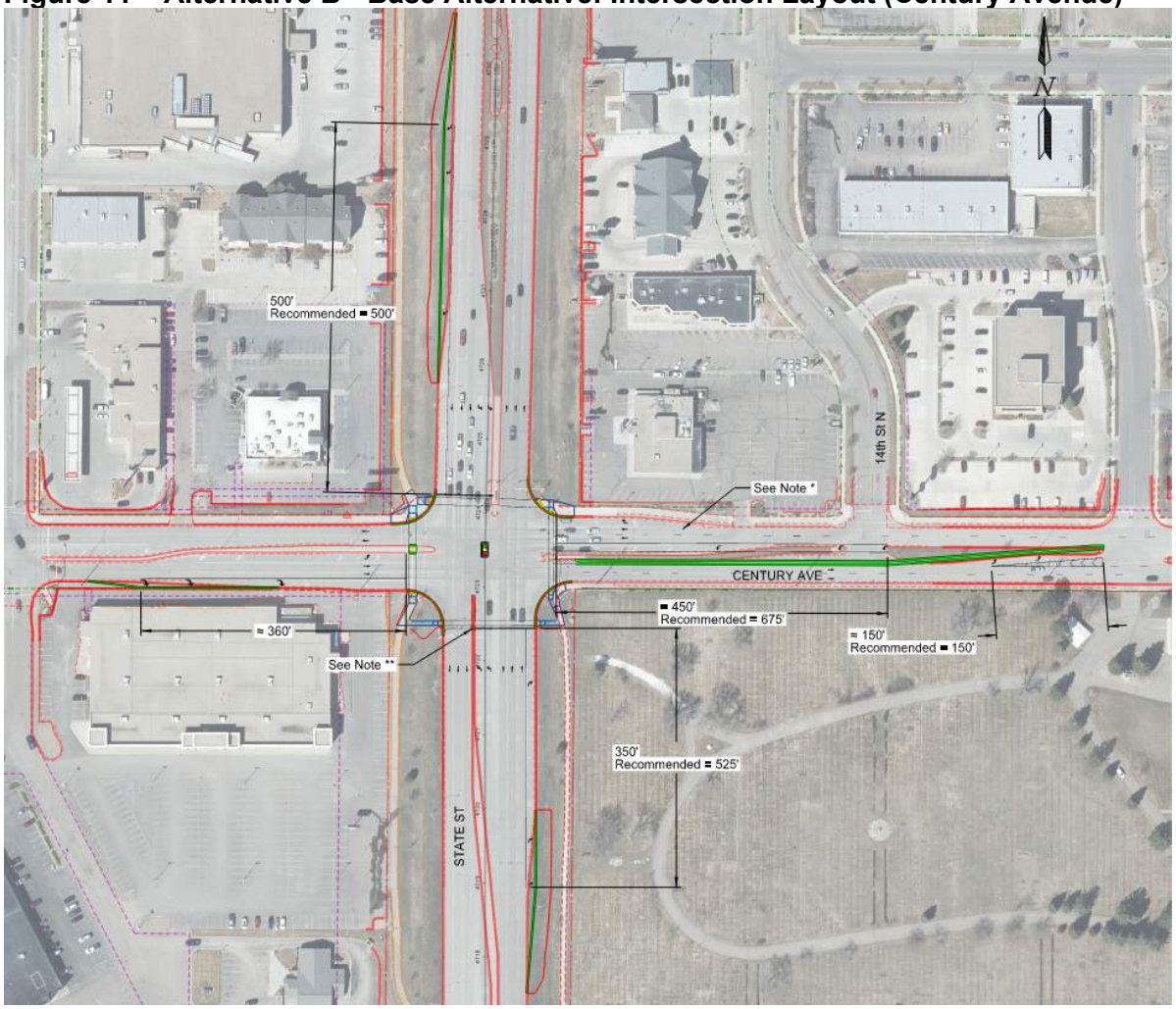
- Extension of the existing northbound right turn lane to 350' length.
- Extension of the existing southbound right turn lane to 500' length.
- Removal of the existing westbound approach median and reconstruction widening the westbound lanes to accommodate dual 425' westbound left turn lanes and new median.
    - The addition of dual westbound left turn lanes result in WB and EB left turn movements being Protected-Only left turn phasing.
- Extension of the EB existing left turn lane at N 15th Street to 150' length.
- In order to accommodate the revised lane configuration, lane widths will be reduced to 11'.
- The median located in the south approach of the intersection will be shortened 41' to allow for turning movements.
- Extension of the existing eastbound right turn lane to 360' length.
- Maintain the existing west approach median and single EB left turn lane.

By revising the existing median of the east approach of the intersection, conflict points associated with the left turn movements from N 14th Street onto Century Ave would be eliminated.

The existing pedestrian ramps in all four quadrants of the intersection (including N 11th Street) will be constructed to maintain ADA accessibility for east/west and north/south pedestrian movements. The existing traffic signal systems will also be replaced.

These improvements are anticipated to operate at an intersection LOS D during the 2039 PM Peak projection.

Figure 11 – Alternative B - Base Alternative: Intersection Layout (Century Avenue)



Century Avenue – Option 1b:

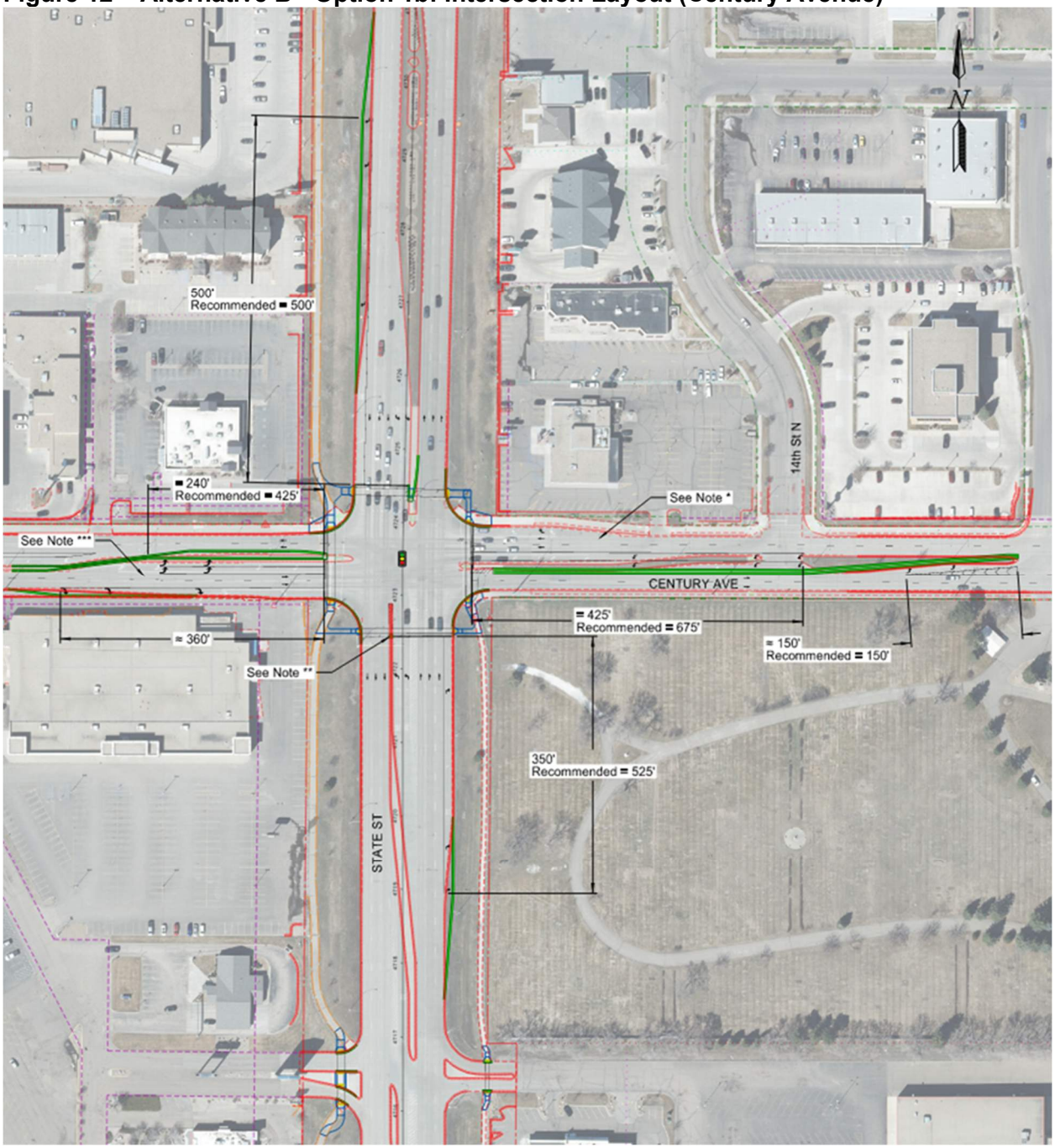
This alternative would include improvements similar to the Base Alternative, except the following notable differences (see **Figure 12)**:

- Removal of the existing eastbound approach median and reconstruction widening the eastbound lanes to accommodate dual 240' eastbound left turn lanes.
- To accommodate the revised lane configuration, lane widths will be reduced to 10'.
- The median in the north approach of the intersection will be shortened 35' to allow for turning movements.
- Relocate light poles within the new median (west approach).

These improvements are anticipated to operate at an intersection LOS D during the 2039 PM Peak projection.

The additional cost for Option 1b improvements is $148,707.

Figure 12 – Alternative B - Option 1b: Intersection Layout (Century Avenue)



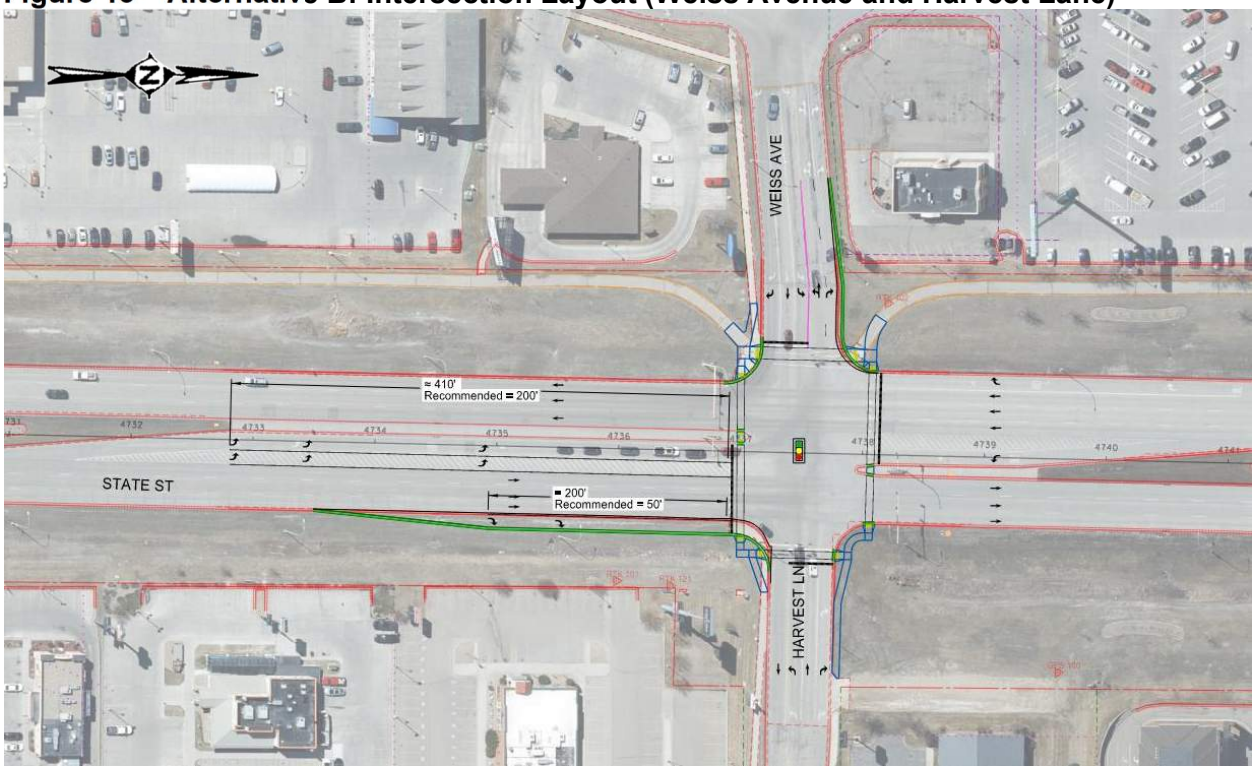
Weiss Avenue and Harvest Lane:
This alternative would consist of the following modifications at Harvest Lane and Weiss Avenue (see **Figure 13)**:

- Restripe the existing northbound single left turn lane into dual 410' long left turn lanes.
- Widen State Street to incorporate a 200' long northbound right turn lane.
- Widen the west approach of Weiss Ave to accommodate the dual northbound left turn lanes.

The existing pedestrian ramps in all four quadrants of the intersection will be constructed to maintain ADA accessibility for east/west and north/south pedestrian movements. The existing traffic signal system will also be replaced.

These improvements are anticipated to operate at an intersection LOS C during the 2039 PM Peak projection.

Figure 13 – Alternative B: Intersection Layout (Weiss Avenue and Harvest Lane)



Calgary Avenue:

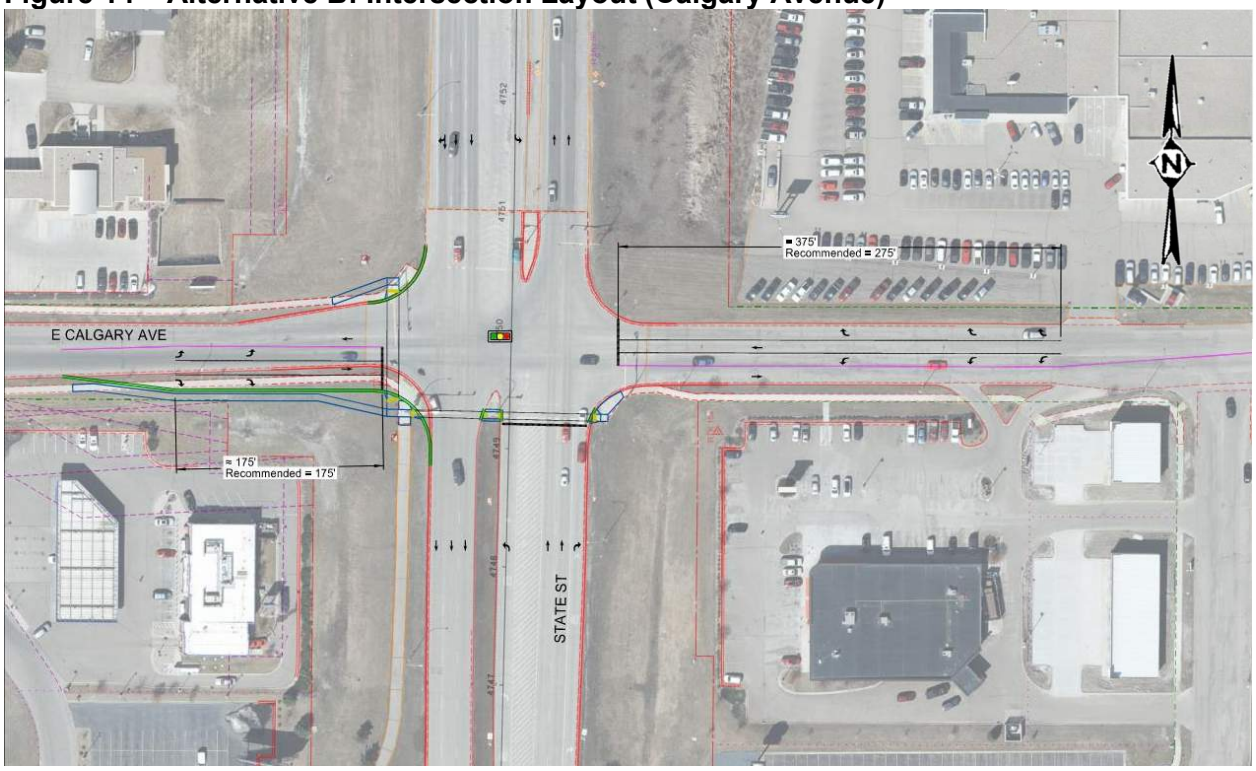
This alternative would consist of the following modifications at Calgary Avenue (see **Figure 14)**:

- Restripe the east approach of the intersection to include a single eastbound thru lane, a 375' long westbound left turn lane, a westbound thru lane and a 375' long westbound right turn lane.
- Realign the west approach of the intersection to reduce the skew and better align with the east approach of the intersection.
- Widen the west approach of the intersection to incorporate a 175' long eastbound right turn lane, single eastbound thru lane, a 175' long eastbound left turn lane and a single westbound thru lane.

The existing pedestrian ramps in the northwest, southwest, southeast quadrants of the intersection will be constructed to maintain ADA accessibility for east/west and north/south pedestrian movements. The existing signal system will also be replaced.

These improvements are anticipated to operate at an intersection LOS C during the 2039 PM Peak projection.

Figure 14 – Alternative B: Intersection Layout (Calgary Avenue)



The probable cost to construct Alternative B (North Segment) ranges from $3,582,396 to $3,847,248, based on the intersection Options selected for Interstate Avenue and Century Avenue.

d. Alternative C (South Segment): Partial Median U-Turn (MUT) at Divide Avenue and Capitol Avenue

This Alternative would significantly change traffic operations along State Street from Divide Avenue to the Interstate 94 Ramps by redirecting left turns from State Street at Divide Avenue and Capitol Avenue to new signalized median U-Turn locations upstream and downstream of the main intersections. Divide Avenue and Capitol Avenue side street approach turning movements remain unchanged. Additional improvements would include access modifications at Spaulding Avenue and Interchange Avenue.

Existing storm sewer will be impacted throughout the corridor due to the roadway modifications. The project will maintain existing drainage patterns by removing and replacing the catch basins, extending existing storm sewer as needed and reestablishing the outlet pipes. No additional storm sewer improvements are proposed as part of the project.

The existing traffic signal systems will also be replaced. For all existing signalized intersections, traffic signal system replacements will include new signal poles, accessible pedestrian signals (APS), and controller cabinets and will include added signal heads, signal head backplates, red light confirmation, additional signal timing plans, and system control.

Improvements included with this Alternative are summarized below by each intersection.

<u>Divide Avenue</u>:
This alternative would include the following improvements (see **Figure 15**):

- Removal of 480’ of existing median in the north approach of the intersection and reconstruction to incorporate a combination 270’ northbound left turn and northbound to southbound U-turn lane and signalized U-turn access point. Northbound left turning movements will be restricted at the Divide Avenue intersection and left turn traffic will be directed through the intersection and utilize the north U-turn access point.
- Extension of southbound right turn lane to 425’ and 73’ of pavement widening to accommodate corresponding U-turn access point.
- The northeast boulevard of the N 12th Street and State St will be shortened 23’ and replaced with pavement to allow for traffic movements from proposed U-turn access point.
- Removal of 240’ of existing median and adjacent pavement at the intersection of State Street and N 12th Street and reconstruction with a median to accommodate the south U-turn access point, remove southbound left turning movements onto N 12th Street and restrict eastbound and westbound traffic of N 12th Street to right turn only.
- Removal of 590’ of existing median in the south approach of the intersection and reconstruction to incorporate a combination 350’ southbound left turn and southbound to northbound U-turn lane and signalized U-turn access point. Southbound left turning movements will be restricted at the Divide Avenue

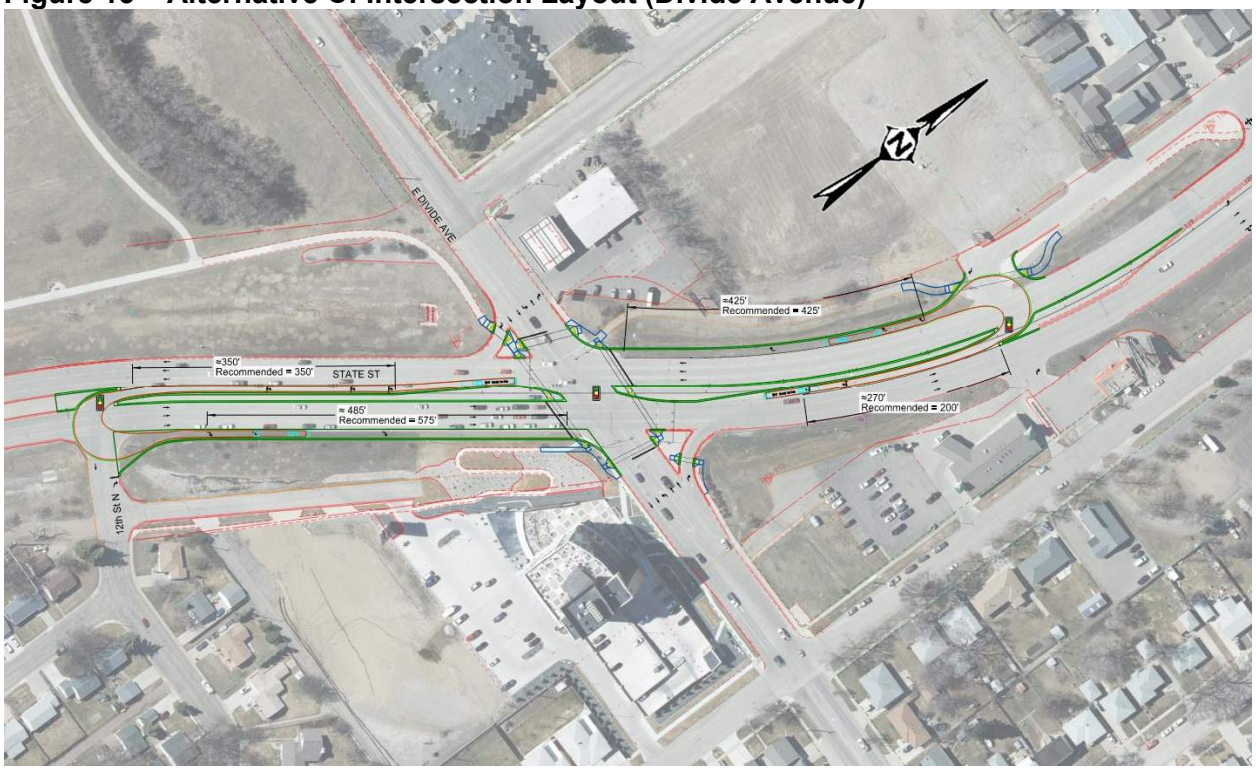
Intersection and left turn traffic will be directed through the intersection and utilize the south U-turn access point.

- Extension of northbound right turn lane to 485’ and 125’ of pavement widening to accommodate corresponding U-turn access point.
- Removal of 40’ of existing median of the south approach of the intersection of State Street and N 12th Street and reconstruction with a median to accommodate the south U-turn access point and restrict N 12th Street westbound traffic movement to right turn only.

The existing pedestrian ramps in all four quadrants of the intersection and both U-turn access points will be constructed to maintain ADA accessibility for east/west and north/south pedestrian movements. The existing traffic signal system will also be replaced.

These improvements are anticipated to operate at an intersection LOS D during the 2039 PM Peak projection.

Figure 15 – Alternative C: Intersection Layout (Divide Avenue)



There are two optional layouts with regards to the south Median U-Turn location for the Capitol Avenue intersection. Improvements noted under Base Alternative would be very similar under Option 1 and Option 2. The notable differences are described under Option 1 and Option 2 respectively.

Capitol Avenue - Base Alternative:

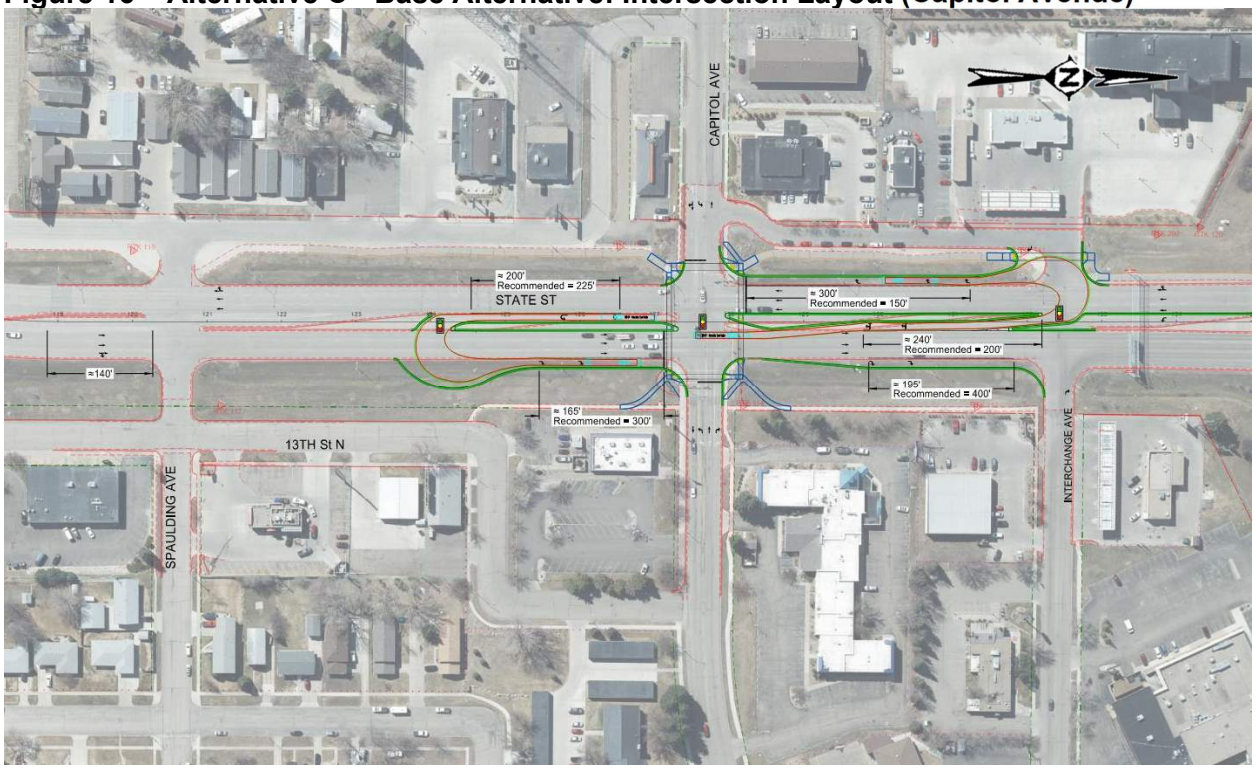
Improvements under this option would include the following (see **Figure 16**):

- Removal of 420' of existing median in the north approach of the intersection and reconstruction to incorporate a combination 240' northbound left turn and northbound to southbound U-turn lane and signalized U-turn access point. Northbound left turning movements will be restricted at the Capitol Avenue intersection and left turn traffic will be directed through the intersection and utilize the north U-turn access point.
- Construction of a 300' southbound right turn lane and 65' of pavement widening to accommodate corresponding U-turn access point. Additionally, the southwest boulevard of the N 12th Street and State St will be shortened 40' and replaced with pavement to allow for traffic movements from proposed U-turn access point.
- Removal of 250' of existing median and adjacent pavement of the north approach of the intersection of State Street and N 12th Street/Interchange Avenue and reconstruction with a median to accommodate the north U-turn access point, remove southbound left turning movements onto Interchange Avenue, and restrict eastbound and westbound traffic of N 12th Street/Interchange Ave to right turn only.
- Construction of 195' right turn lane from northbound State Street onto Interchange Avenue.
- Removal of 360' of existing median in the south approach of the intersection and reconstruction to incorporate a 200' southbound to northbound U-turn lane and signalized U-turn access point. Southbound left turning movements will be restricted at the Capitol Avenue intersection and left turn traffic will be directed through the intersection and utilize the south U-turn access point.
- Addition of a dedicated 165' northbound right turn lane and a 195' loon to accommodate the corresponding U-turn access point.
- No modifications to the Spaulding Avenue Intersection (Full Access).

The existing pedestrian ramps in all four quadrants of the intersection and both U-turn access points will be constructed to maintain ADA accessibility for east/west and north/south pedestrian movements. The existing traffic signal system will also be replaced.

These improvements are anticipated to operate at an intersection LOS B during the 2039 PM Peak projection.

Figure 16 – Alternative C - Base Alternative: Intersection Layout (Capitol Avenue)



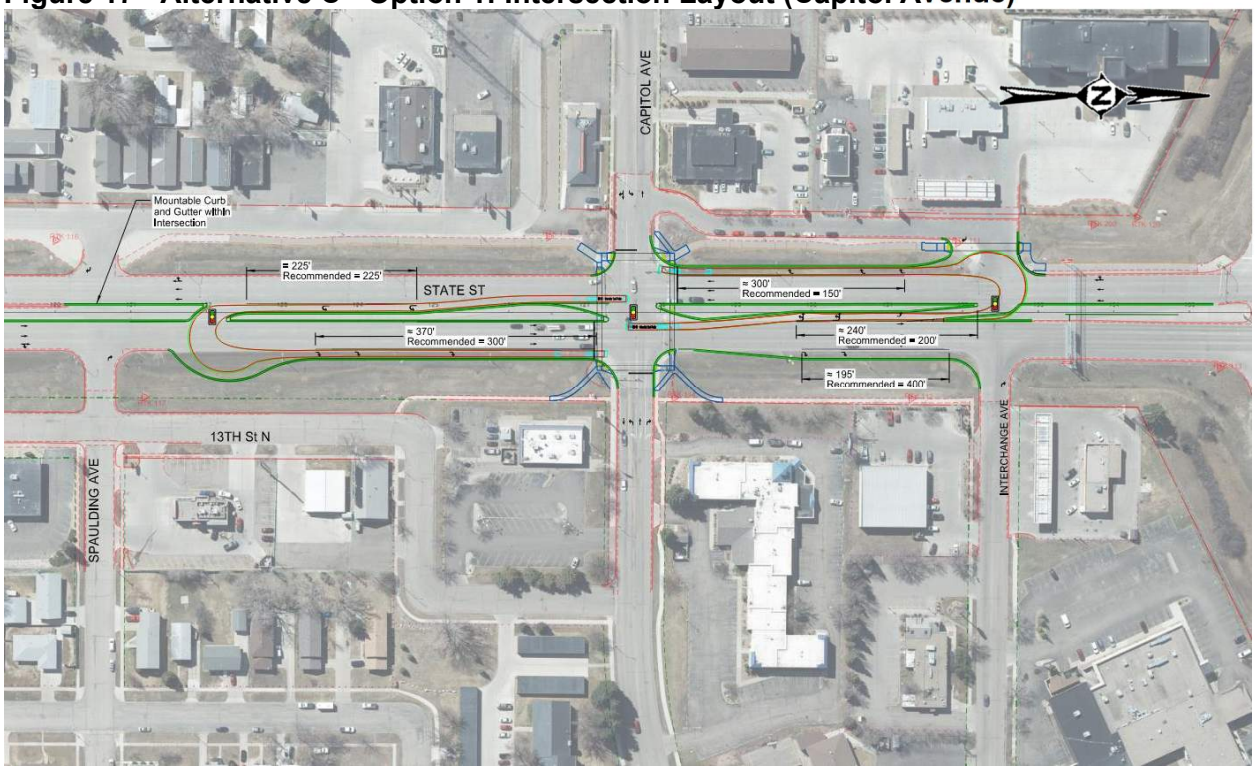
Capitol Avenue – Option1:

Improvement differences under this option include the following (see **Figure 17**):

- Removal of 645’ of existing median in the south approach of the intersection and reconstruction to incorporate a 225’ southbound to northbound U-turn lane and signalized U-turn access point. Southbound left turning movements will be restricted at the Capitol Avenue intersection and left turn traffic will be directed through the intersection and utilize the south U-turn access point.
- Construction of a 370’ northbound right turn lane and a 195’ loon to accommodate the corresponding U-turn access point.
- Removal of 245’ of existing median of the south approach of the intersection of State Street and Spaulding Avenue and reconstruction with a median to accommodate the south U-turn access point, remove northbound left turning movements onto Spaulding Avenue, and restrict eastbound and westbound traffic of Spaulding Avenue to right turn only (RIRO).

Option 1 would be $269,975 more than that of the Base Alternative improvements.

Figure 17 - Alternative C - Option 1: Intersection Layout (Capitol Avenue)



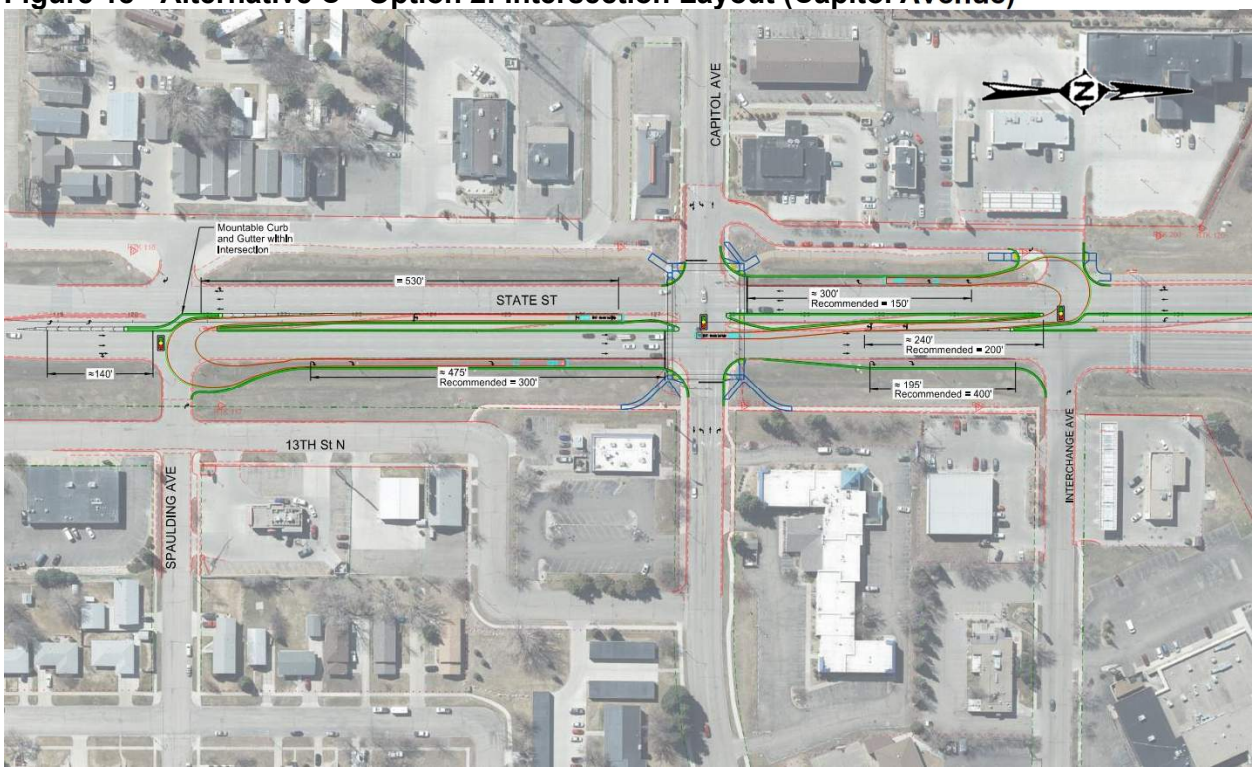
Capitol Avenue - Option 2:

Improvement differences under this option include the following (see **Figure 18**):

- Removal of 645’ of existing median in the south approach of the intersection and reconstruction to incorporate a combination 530’ southbound left turn and southbound to northbound U-turn lane and signalized U-turn access point. Southbound left turning movements will be restricted at the Capitol Avenue intersection and left turn traffic will be directed through the intersection and utilize the south U-turn access point.
- Construction of a 475’ northbound right turn lane and 165’ pavement widening to accommodate the corresponding U-turn access point.
- Addition of a raised median utilizing mountable curb and gutter within the intersection of State Street and Spaulding Ave creating 3/4 Access and permitting northbound and southbound left turn movements only (RIROLI).

Option 2 would be $214,459 more than that of the Base Alternative improvements.

Figure 18 - Alternative C - Option 2: Intersection Layout (Capitol Avenue)



I-94 EB Off-Ramp Lane Extension and WB Ramp Intersections:

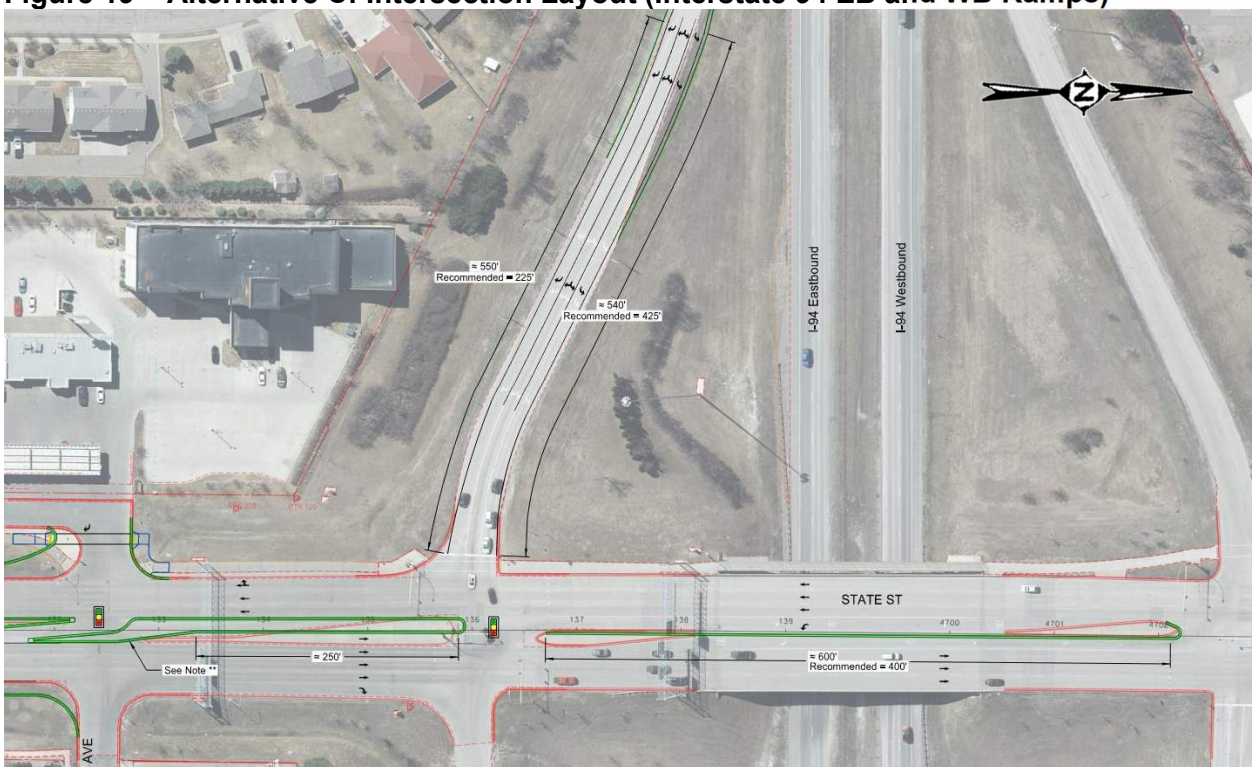
This alternative would include the following improvements at the Interstate 94 Eastbound and Westbound Ramps.

- Extension of eastbound I-94 offramp right turn lane to 550'.
- Extension of eastbound I-94 offramp left turn lane to 540'.
- Removal of 305' of existing median and adjacent pavement in the south approach of the intersection and reconstruction to incorporate a 250' northbound thru lane, remove southbound left turning movements onto Interchange Avenue, and restrict eastbound and westbound traffic of Interchange Avenue to right turn only.
- Removal of 625' of existing median in the north approach of the intersection and reconstruction to incorporate a 600' northbound left turn lane.

The existing pedestrian ramps in all four quadrants of the intersection and both U-turn access points will be reconstructed to maintain ADA accessibility for east/west and north/south pedestrian movements. The existing traffic signal systems at the EB Off-Ramp and WB Off-Ramp will also be replaced. See **Figure 19**.

These improvements are anticipated to operate at an intersection LOS C during the 2039 PM Peak projection.

Figure 19 – Alternative C: Intersection Layout (Interstate 94 EB and WB Ramps)



The probable cost to construct Alternative C (South Segment) ranges from $4,187,184 to $4,457,159, based on intersection Options selected at Capitol Avenue.

e. Alternative C (North Segment): Partial Median U-Turn (MUT) at Century Avenue

This Alternative would significantly change traffic operations along State Street from the Gateway Mall/McDonalds entrance to Century Avenue by redirecting left turns from State Street at Century Avenue to new signalized median U-Turn locations upstream and downstream of the main intersections. Century Avenue side street approach turning movements remain unchanged. Additional improvements would include turn lane improvements and access modifications along Century Avenue.

Existing storm sewer will be impacted throughout the corridor due to the roadway modifications. The project will maintain existing drainage patterns by removing and replacing the catch basins, extending existing storm sewer as needed and reestablishing the outlet pipes. No additional storm sewer improvements are proposed as part of the project.

The existing traffic signal systems will also be replaced. For all existing signalized intersections, traffic signal system replacements will include new signal poles, accessible pedestrian signals (APS), and controller cabinets and will include added signal heads, signal head backplates, red light confirmation, additional signal timing plans, and system control.

Improvements included with this Alternative are summarized below by each intersection.

Note: Improvements to Interstate Avenue, Weiss Avenue/Harvest Lane, and Calgary Avenue under Alternative C are the same as described under Alternative B (North Segment): Traditional Turn Lane Modifications.

<u>Century Avenue – Base Alternative:</u>
This alternative would include the following improvements at Century Avenue (see **Figure 20)**:

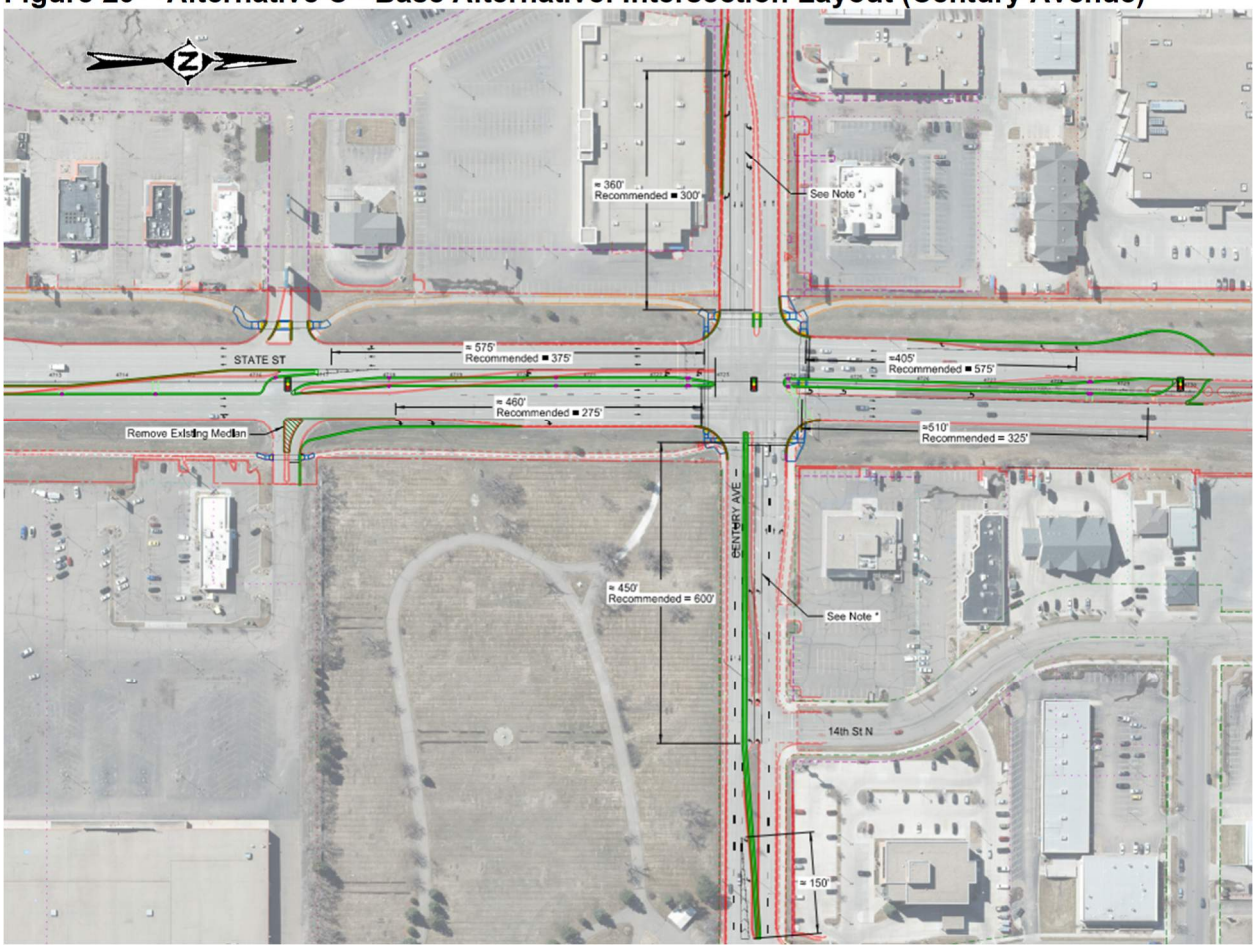
- Removal of 640’ of existing median in the north approach of the intersection and reconstruction to incorporate a northbound to southbound 510’ U-turn lane and signalized U-turn access point. Northbound left turning movements will be restricted at the Century Avenue intersection and left turn traffic will be directed through the intersection and utilize the north U-turn access point.
- Extension of southbound right turn lane to 405’ and a 200’ loon for corresponding U-turn access point.
- Removal of 620’ of existing median in the south approach of the intersection and reconstruction to incorporate a combination 575’ southbound left turn and southbound to northbound U-turn lane and signalized U-turn access point. Southbound left turning movements will be restricted at the Century Avenue intersection and left turn traffic will be directed through the intersection and utilize the south U-turn access point.
- Extension of northbound right turn lane to 460’ and 145’ of pavement widening to accommodate corresponding U-turn access point. Additionally, 52’ of existing median located in the McDonald’s access road will be replaced with pavement to allow for traffic movements from proposed U-turn access point.

- Removal of 402’ of existing median and adjacent pavement and reconstruction to restrict left turn movements into Gateway Fashion Mall and accommodate corresponding southbound to northbound U-turn access point.
- Removal of the existing westbound approach median and reconstruction widening the westbound lanes to accommodate dual 450’ westbound left turn lanes and new median. To accommodate the revised lane configuration, lane widths will be reduced to 11’.
    - The addition of dual westbound left turn lanes result in WB and EB left turn movements being Protected-Only left turn phasing.
- Extension of the existing eastbound right turn lane to 360’ length.

The existing pedestrian ramps in all four quadrants of the intersection and the McDonalds’s access roadway south of the intersection will be constructed to maintain ADA accessibility for east/west and north/south pedestrian movements. The existing traffic signal systems at N 11th Street and State Street will also be replaced.

These improvements are anticipated to operate at an intersection LOS C during the 2039 PM Peak projection.

Figure 20 – Alternative C - Base Alternative: Intersection Layout (Century Avenue)



Century Avenue – Option 1b:

This alternative would include improvements similar to the Base Alternative, except the following notable differences (see **Figure 21)**:

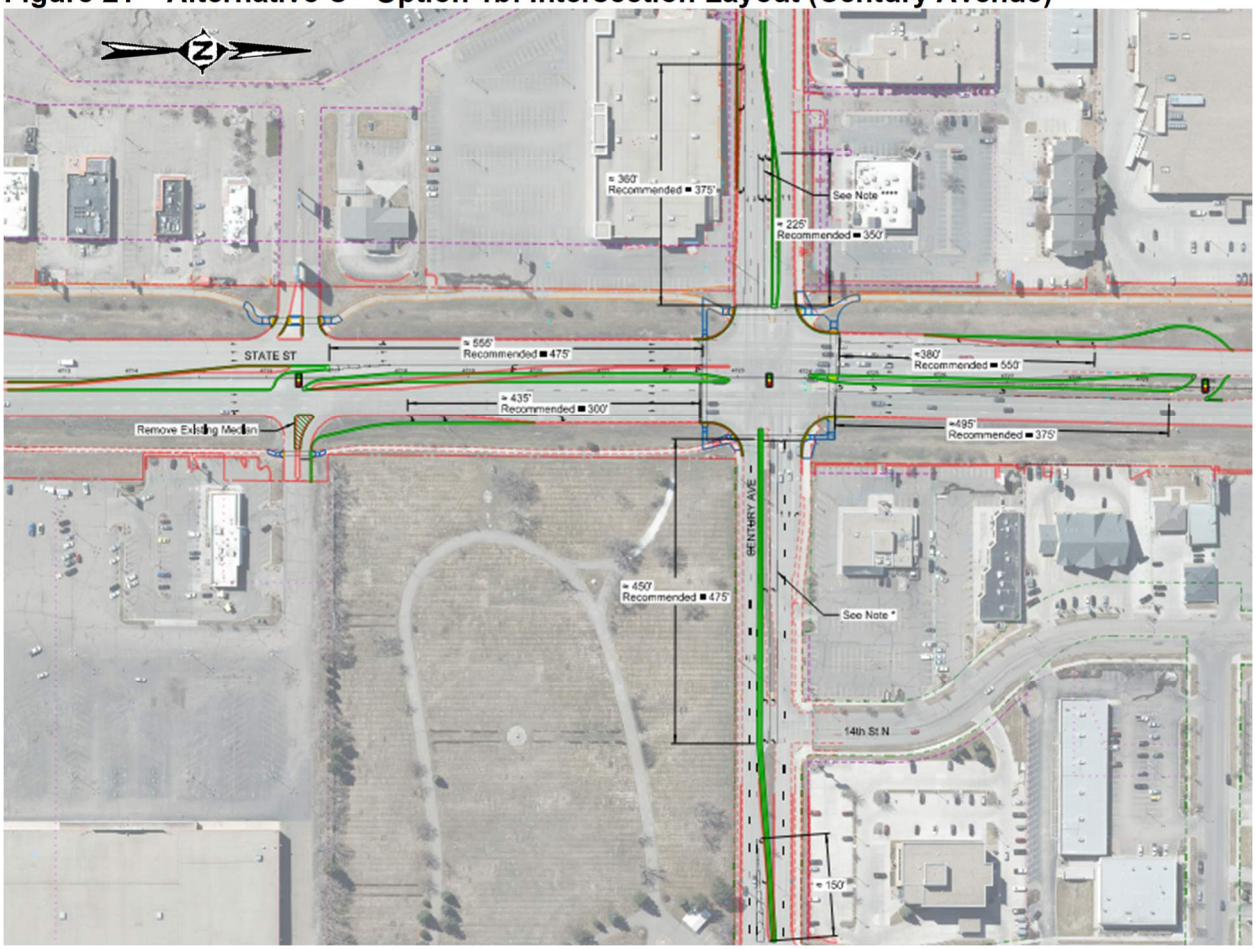
- Removal of 640’ of existing median in the north approach of the intersection and reconstruction to incorporate a northbound to southbound 495’ U-turn lane and signalized U-turn access point. Northbound left turning movements will be restricted at the Century Avenue intersection and left turn traffic will be directed through the intersection and utilize the north U-turn access point.
- Extension of southbound right turn lane to 380’ and a 200’ loon for corresponding U-turn access point.
- Removal of 620’ of existing median in the south approach of the intersection and reconstruction to incorporate a combination 555’ southbound left turn and southbound to northbound U-turn lane and signalized U-turn access point. Southbound left turning movements will be restricted at the Century Avenue intersection and left turn traffic will be directed through the intersection and utilize the south U-turn access point.
- Extension of northbound right turn lane to 435’ and 145’ of pavement widening to accommodate corresponding U-turn access point. Additionally, 52’ of existing median located in the McDonald’s access road will be replaced with pavement to allow for traffic movements from proposed U-turn access point.
- Removal of the existing eastbound approach median and reconstruction widening the eastbound lanes to accommodate dual 225’ eastbound left run lanes and new median. To accommodate the revised lane configuration, lane widths will be reduced to 10’.

These improvements are anticipated to operate at an intersection LOS C during the 2039 PM Peak projection.

The additional cost for Option 1b improvements is $192,122.

The probable cost to construct Alternative C (North Segment) ranges from $4,699,005 to $5,007,272, based on the intersection Option selected at Century Avenue and alternatives/options previously described under Alternative B (North Segment) for Interstate Avenue, Weiss Avenue/Harvest Lane, and Calgary Avenue intersections.

Figure 21 – Alternative C - Option 1b: Intersection Layout (Century Avenue)



f. Alternative D: Concrete Pavement & Structure Repair (South Segment)

This alternative would consist of the following pavement maintenance measures from Divide Avenue to the centerline of Interstate 94. See **Figure 22**.

- Full depth concrete repair at 44 sites totaling 1167 square yards.
- Concrete stitching at 21 sites totaling 404 linear feet.
- Curb replacement at 4 sites totaling 43 linear feet.
- Partial depth spall repair at 162 sites total 2073 square feet.

Project improvements also include structure repairs to Bridge #0094-159.419 which crosses over Interstate 94. These structure repairs include:

- Deck Spall Repairs.
- Joint Sealing.
- Abutment & Pier Spall Repairs.
- Barrier Repairs & Resurfacing.
- Approach Slab Foam Jacking.

The probable cost to construct Alternative D is $460,000.

Figure 22 – Alternative D: Layout (Divide Avenue to Interstate 94)

g. Alternative E: Concrete Pavement & Structure Repair (North Segment)

This alternative would consist of the following pavement maintenance measures from the centerline of Interstate 94 to Calgary Avenue. See **Figure 23**.

- Full depth concrete repair at 37 sites totaling 523 square yards.
- Concrete stitching at 33 sites totaling 314 linear feet.
- Curb replacement at 6 sites totaling 63 linear feet.
- Partial depth spall repair at 225 sites total 2267 square feet.

Project improvements also include structure repairs to Bridge #0094-159.419 which crosses over Interstate 94. These structure repairs include:

- Deck Spall Repairs.
- Joint Sealing.
- Abutment & Pier Spall Repairs.
- Barrier Repairs & Resurfacing.
- Approach Slab Foam Jacking.

The probable cost to construct Alternative E is $335,000.

Figure 23 – Alternative E: Layout (Interstate 94 to Calgary Avenue)

h. Traffic Control Work Zone Safety and Mobility

These projects are designated as non-significant projects; therefore, the work zone traffic control for these projects will be summarized in this environmental document. This meets the criteria for non-significant projects as outlined in the NDDOT Work Zone Safety and Mobility Program – February 2007 and the ND 2022-2025 Final Statewide Transportation Improvement Program (STIP).

i. Work Zone Traffic Control

This project is currently programmed for the 2023 construction season and anticipate remaining traffic signal work may extend into the 2024 construction season. During final design of the project improvements, the temporary work zone traffic control (WZTC) plan will be developed to address traffic control with respect to phased improvements at each intersection. It is anticipated that the WZTC plan will include temporary lane closures (through traffic and turn lanes) to facilitate construction and provide safety for the construction crews. The WZTC plan will be developed to maintain through traffic and turning movements at all locations that currently exist, providing the least disruption to the travelling public and business access during the construction phase. There are no detours anticipated for construction of the project alternatives. Many of the improvements involve extension or addition of new turn lanes and/or work near the median.

Concrete pavement repair work on the mainline pavement would be phased as such to minimize mainline closures and be completed as part of the lane closures to complete turn lane(s) or median improvements.

WZTC devices will include temporary signs, channelizing devices, temporary pavement markings (as needed), sequencing arrow board panels, changeable message signs, flaggers, temporary traffic signals, and other safety devices.

j. Maintenance Responsibility Discussion

Maintenance of the project corridor for areas outside the Interstate 94 right of way will be divided between the City of Bismarck and the North Dakota Department of Transportation. The City of Bismarck will maintain the traffic signal systems along the project corridor.

All maintenance responsibilities and ownership will be agreed to in a Cost Participation and Maintenance Agreement prior to the project being bid.

k. Summary of Engineering Issues

Due to the existing traffic volumes, traffic operations have deteriorated below acceptable levels of service. In order to improve the LOS, multiple turn lane and sign modifications are proposed. Turning movements throughout the corridor have been designed to accommodate a WB-67.

Due to the improvements throughout the corridor, ADA curb ramps will be replaced throughout the corridor to meet ADA compliance.

I. Summary of Environmental Issues

Wetlands:
Eighteen wetlands have been identified within the project area and seventeen classified as artificial ditch and one natural wetland. The USACE issued an approved Jurisdictional Determination (AJD) on May 21, 2021 with an ORM Number: NWO-2014-00357-BIS. The USACE AJD identified the artificial ditch wetlands are not waters of the US and are not jurisdictional. There are no proposed impacts to the sole jurisdictional wetland (Wetland 12d). Based on the classification of the artificial ditch wetlands, mitigation would not be required as these wetlands are not waters of the United States and are not jurisdictional under Section 404 of the Clean Water Act. These aquatic resources are not regulated because they are a category of resource that has been excluded pursuant to the Navigable Waters Protection Rule.

With respect to the four build alternatives, Alternative B and Alternative C, which have relatively the same footprint within the existing right of way but do have minor differences in the impacts regarding Wetlands impacts. Wetland impacts will be minimized to the extent possible through avoidance. It has been estimated that 0.086 acres will be permanent impacted permanent by Alternative B and 0.105 acres will be permanently impacted by Alternative C. Alternative D and Alternative E improvements are bounded by the existing pavement area and have no wetland impacts. See Appendix C for a summary of the wetland impacts differences.

Cultural Resources:
A Class I Literature Review was completed for the proposed project corridor by Juniper, LLC in February 2021. The survey noted two resources within the area of potential effect (APE). The remaining resources lie outside the APE and will not be impacted by the project. With improvements proposed to be within the existing right of way, the resources noted within the APE will not be adversely impacted by the project. This determination was concurred by SHPO in March 2021.

Section 4(f):
There are no Section 4(f) properties that will be permanently impacted by the project, however the multi-use trail system Section 4(f) facility under the jurisdiction of the Bismarck Parks and Recreation District will be temporarily impacted by the proposed intersection modifications and concrete pavement repair work. The Bismarck Parks and Recreation District issued a concurrence that the proposed improvement alternatives and associated temporary impacts meet the temporary occupancy of land and are minimal as to not constitute a use within the meaning of Section 4(f). See Appendix D for a summary of the Section 4(f) documentation.

Federal Migratory Bird Treaty Act:
Alternatives D and E incorporate minor rehabilitation work on Bridge #0094-159.419, which includes repairs to the deck, abutment, and piers. Due to the proposed work under the structure, special provision SSP2 - Federal Migratory Bird Treaty Act will be included with final construction plans.

Table 5 denotes a summary of the temporary and permanent right of way impacts for Alternatives A, B, C, D, and E improvements.

Table 5 – Right of Way Summary

Alternatives	Temporary ROW Needed (Total)	Permanent ROW Needed	US Fish & Wildlife Property Interest?	US Forest Service Property Interest?
Project No. SHE-1-083(118)901 - Intersection Improvements Divide Avenue to Interstate 94 EB and WB Ramps (South Segment)				
Alternative A:	0.00 Acres	0.00 Acres	No	No
Alternative B:	0.019 Acres	0.00 Acres	No	No
Alternative C:	0.019 Acres	0.00 Acres	No	No
Project No. SHE-1-083(119)088 - Intersection Improvements Interstate Avenue to Calgary Avenue (North Segment)				
Alternative A:	0.00 Acres	0.00 Acres	No	No
Alternative B: Base Alternative	0.157 Acres	0.004 Acres	No	No
Interstate Avenue Option 1a: Raised Median	0.070 Acres(1) (0.227 Acres)	0.008 Acres(1) (0.012 Acres)	No	No
Century Avenue Option 1b: Dual EB Left Turn Lane	0.016 Acres(1) (0.173 Acres)	0.00 Acres(1) (0.004 Acres)	No	No
Alternative C: Base Alternative	0.157 Acres	0.004 Acres	No	No
Interstate Avenue Option 1a: Raised Median	0.070 Acres(1) (0.227 Acres)	0.008 Acres(1) (0.012 Acres)	No	No
Century Avenue Option 1b: Dual EB Left Turn Lane	0.016 Acres(1) (0.173 Acres)	0.00 Acres(1) (0.004 Acres)	No	No
Project No. NHU-IM-1-083(133)901 - Concrete Pavement & Structure Repair Divide Avenue to Interstate 94 (South Segment)				
Alternative D:	0.00 Acres	0.00 Acres	No	No
Project No. NHU-IM-1-083(134)088 - Concrete Pavement & Structure Repair Interstate 94 to Calgary Avenue (North Segment)				
Alternative E:	0.00 Acres	0.00 Acres	No	No

(1) Acreages listed as additional impacts when compared to Alternatives B or C.

Table 6 – Summary of Estimated Costs

Alternative	Probable Cost
Project No. SHE-1-083(118)901 - Intersection Improvements Divide Avenue to Interstate 94 EB and WB Ramps (South Segment)	
Alternative A: No Build	$0
Alternative B: Traditional Turn Lane Modifications	$2,885,816
Alternative C: Partial Median U-Turn at Divide Ave & Capitol Ave Base Alternative: Spaulding Ave - No Modifications (Full Access)	$4,187,184
Alternative C: Partial Median U-Turn at Divide Ave & Capitol Ave Option 1: Spaulding Ave - Right-In/Right-Out Access (RIRO)	Add $269,975
Alternative C: Partial Median U-Turn at Divide Ave & Capitol Ave Option 2: Spaulding Ave - 3/4 Access (RIROLI)	Add $214,459
Project No. SHE-1-083(119)088 - Intersection Improvements Interstate Avenue to Calgary Avenue (North Segment)	
Alternative A: No Build	$0
Alternative B: Traditional Turn Lane Modifications Interstate Avenue Intersection – East Approach Base Alternative: Flush Median Century Avenue Intersection – West Approach Base Alternative: Single EB Left Turn Lane with Raised Median	$3,582,396
Alternative B: Interstate Avenue Intersection – East Approach Option 1a: Raised Median	Add $116,145
Alternative B: Century Avenue Intersection – West Approach Option 1b: Dual EB Left Turn Lane with Raised Median	Add $148,707
Alternative C: Partial Median U-Turn Interstate Avenue Intersection – East Approach Base Alternative: Flush Median Century Avenue Intersection – West Approach Base Alternative: Single EB Left Turn Lane with Raised Median	$4,699,005
Alternative C Interstate Avenue Intersection – East Approach Option 1a: Raised Median	Add $116,145
Alternative C: Century Avenue Intersection – West Approach Option 1b: Dual EB Left Turn Lane with Raised Median	Add $192,122
Project No. NHU-IM-1-083(133)901 - Concrete Pavement & Structure Repair Divide Avenue to Interstate 94 (South Segment)	
Alternative A: No Build	$0
Alternative D: Concrete Pavement & Structure Repair	$460,000
Project No. NHU-IM-1-083(134)088 - Concrete Pavement & Structure Repair Interstate 94 to Calgary Avenue (North Segment)	
Alternative A: No Build	$0
Alternative E: Concrete Pavement & Structure Repair	$335,000

G. Comments from the Documented CATEX

Comment:

Response:

H. Public Concerns / Need for Public Input

Solicitation of views letters were sent to various local, state, and federal agencies with interests within or adjacent to the project area on January 25, 2021. Solicitation of views letters, list of the agencies to which the letters were sent, and responses are included in Appendix A.

An in-person Business Owner's Meeting was held on November 30, 2021 and an in-person Public Input Meeting was held on December 6, 2021. In addition, a Virtual Public Input Meeting presentation was hosted through the NDDOT Public Event Calendar website. Public comments were accepted for fifteen days following the Public Input Meeting. Comments and responses from the public meetings are summarized in **Table 8 Summary of Comments/Responses**. The Public Involvement Report contains a complete table of all comments received in their entirety and responses.

Table 7 – Summary of Comments/Responses

Topic	Comments	Responses
Divide Avenue and Capitol Avenue MUT	Placing a MUT at the N 12th Street intersection and the frontage road intersection is not a good idea.	Side street approaches noted in the comment would include a partially raised colored pavement area to aid in delineating the right turn movement, while providing an overturn area for large vehicles.
On-Ramps at I-94	Create new on-ramps at State St and I-94.	This alternative would require additional right-of-way acquisition and reconfiguration of the interchange which is beyond the scope and budget of the current project.
Interchange Avenue Intersection (3)	Area of concern due to the high volume of collisions and the increased speed. Main issue is some motorists that attempt to make a SB left turn from State St to proceed EB on Interchange Ave. Another somewhat common occurrence is when motorists attempt to make a left turn from Interchange Ave to proceed north or south on State St. The maneuver frequently results in a collision.	The current alternatives proposed reduce the turn movements from the side streets to right-in / right-out. Alternative B would permit NB and SB left turns from State St. Alternative C would only permit signalized NB left turns from State St.
	Your proposal to take away the left turn exit from our property at 2210 N 12th Street would have a detrimental effect on our daily operations. I am pleading with you to leave this corridor alone. The most crucial piece of a convenience store is ease of access. The future of our success and the opportunity for more generations to grow will	Comment noted and will be carried forwarded during the evaluation process.

	depend on the decision you make.	
	Your proposed construction will KILL our business. By limiting exit choices our customers will have no reasonable way of leaving our station. We are a convenience store if you can't get in and out people will stop coming and we need traffic to survive. Alternative A, a no build solution is the only design that works for our business.	Comment noted and will be carried forwarded during the evaluation process.
N 12th Street, Interchange Avenue, Spaulding Avenue, and McDonalds /Gateway Mall	These accesses should be converted to RIRO only. Converting these access points to RIROLI will not resolve the issue causing the crashes at these locations. During peak hours when main line traffic is queued in two of the three through lanes, opposing left turning vehicle blindly turns left across the two lanes of stopped traffic and is struck by a vehicle traveling in the outside lane. Continuing to allow left turns at these intersections does not eliminate the cause of the crash. The only way to eliminate angle crashes at these intersections is to allow only RIRO movements	Comment noted and will be carried forwarded during the evaluation process.
Interstate Avenue (5)	Relocate existing Kmart/ Arby's access as far east as reasonable.	Consideration has been given to contact the property owner and discuss the possibility of moving the current access east to align with the south access.
	The proposed median is not good for any of us on this street, we already get way to much traffic cutting across our lot from Motel 6, Krolls, Simonson's and Dakota Boys Ranch Thrift Store. It already at times becomes unsafe for our customers and truck deliveries. Adding this median on Interstate Ave would only make that traffic across our Lot worse.	Comment noted and will be carried forwarded during the evaluation process.
	My first choice would be Alternative B, my second choice would be Alternative A, my third choice would be Alternative C.	Comment noted and will be carried forwarded during the evaluation process.

	I question the median being proposed between Simonson's and Arby's. Is this median really necessary and for what purpose does it serve? Seems like a poor use of good road space. People leaving the car wash are not going to want to drive east a couple of blocks and then have to turn around and drive west because the want to get onto State Street.	Comment noted and will be carried forwarded during the evaluation process.
	I believe the changes outlined in Alternate B are acceptable and would make the street safer. I do have concerns with Alternate C which would not allow left turns into side streets and would require business visitors to make a modified U-turn to access properties.	Comment noted and will be carried forwarded during the evaluation process.
Century Avenue MUT (2)	It was stated the intent of a MUT is to deal with the high volume of left turning on State Street. In the FHWA video shown in the meeting the statement was made that the optimal use of a MUT is at low volume minor intersections.	Candidate locations for full or partial median u-turns include roadways with high major-street through movements, low-to-medium left turns from the major street, low-to-medium left turns from the minor street and any amount of minor-street through traffic. Appendix A in the link below provides examples of where MUTs have been installed. It also provides detailed information for three locations across the United States. fhwasa14069.pdf (dot.gov)

	I am not sure if a Median U Turn is an option for the westbound traffic on Century Avenue. The left-hand turn lane at Century Avenue and State Street is backed up about 85% of the time. There are times people sit there for at least 2 or 3 cycles of the light. Of course, the impatient people are running that light all the time. Also, please consider timing the traffic lights for the north and southbound traffic which I believe with assist with the flow of traffic.	The westbound left turn movements will be maintained with all build alternatives. Improvements at the Century Avenue Intersection include implementing dual westbound left turn lanes, extending storage lengths of the eastbound left turn lane to N 15th Street, eastbound right turn lane on Century Avenue, northbound and southbound right turn lanes on State Street, and modifying N 14th Street access to right-in/right-out. All alternatives for this project will include signal timing improvements. Improvements will seek to improve overall traffic flow and progression for northbound and southbound traffic.
MUT Intersections	FHWA – read the TechBrief at the attached link: https://www.fhwa.dot.gov/publications/research/safety/09057/index.cfm The "Applicability" section conditions does not consider the use of MUTS for high volume left turns as a condition for installing a MUT.	Per the 2018 AASHTO Green Book, "Median U-turn roadways may be appropriate at intersections with high major-street through movements, low-to-medium left turns from the major street, low-to-medium left turns from the minor street and any amount of minor-street through traffic. Using the intersection of State Street and Century Ave as an example, State Street left turning traffic accounts for approximately 12.5% of the total NB/SB traffic. Using the guidance above, this low-to-medium volume makes a Median U-turn appropriate
Century Avenue & N 11th Street Intersection	As traffic volumes increase there will be a need for a westbound right turn lane on Century Avenue at N 11th Street. Could this be included on this project?	Inquiry will be forwarded to traffic operations for review on warrant for WB to NB right turn lane on Century Ave.
Calgary Avenue	Overall pleased with the changes to Calgary Ave at State St. The intersection onto State S off of Calgary Ave needs controlled turn signals in the turning lanes both east and west bounds. During high traffic times, the turning lane backs up way too far when people turning left have to yield.	The existing traffic signals will be replaced with 4-section signal heads, which will provide the ability to phase the left turn movements as protected and protected/permissive. Initially, the intersection will operate as it currently does with protected left turns from State St and permissive left turns from Calgary Ave.

Project Corridor (3)	The speed limit on State Street from south of Divide Avenue all the way to Calgary Avenue is posted as 40 mph. If there are a lot of accidents then some thought should be given to reducing the speed limit on State Street, motorists are simply driving too fast. Per the video, most accidents are rear end, which indicates motorists were driving too fast.	Comment noted and will be carried forwarded during the evaluation process.
	Blinking yellow caution lights similar to the lights on Boulevard Avenue prior to the 9th Street stop lights would also alert drivers to be more aware of their speed.	Comment noted and will be carried forwarded during the evaluation process.
	Project is not needed on State Street. Many of the accidents are weather related and this project won't address that. Many of the businesses on the east side of State Street will be impacted. This money could be better used in other parts of the City.	Comment noted and will be carried forwarded during the evaluation process.

Table 8 – Comparison of Alternatives

Alternative/Option	Advantages	Disadvantages
Project Nos. SHE-1-083(118)901, PCN 20097; SHE-1-083(119)088, PCN 20098 NHU-IM-1-083(133)901, PCN 22769; NHU-IM-1-083(134)088, PCN 22770		
All Areas (South Segment and North Segment)		
Alternative A: No Build	• Lowest Initial Cost	• Does not address the purpose and need of the project • Continued maintenance projects required to maintain roadway and traffic signal systems • Continued poor Level of Service (LOS) throughout the corridor
Project No. SHE-1-083(118)901, PCN 20097		
Divide Avenue to Interchange Avenue (South Segment)		
Alternative B: Traditional Turn Lane Modifications	• Lower cost than Alt C • 20% less delay than Alt A • Improved intersection safety (3/4 Access at Spaulding Ave and Interchange Ave) • Provides side street access for main roadway movements (3/4 Access at Spaulding Ave and Interchange Ave)	• Future intersection LOS F (Divide Ave) • Future intersection LOS E (Capitol Ave)
Alternative C: Partial Median U-Turn (MUT)	• Future intersection LOS D (Divide Ave) • Future intersection LOS B (Capitol Ave and Interchange Ave) • Improved intersection safety • Less delay than Alt B • 30% less conflicts points than Alt B • Fits within existing ROW • Side street movements unchanged	• Require education campaign on traffic operational changes • Potential exists for left turn from main roadway • Some movements require rerouting and longer travel distance • Business access more difficult Increased right turn / pedestrian crash potential • Side street right turns could collide with U-Turn vehicle • Additional traffic signal coordination and maintenance • Higher cost than Alt B
Base Alternative (MUT): Spaulding Avenue Intscn No Modifications (Full Access)	• No change in intersection operation	• No improvement in intersection safety
Option 1 (MUT): Spaulding Avenue Intscn	• Improved intersection safety	• No left turns from State Street

Right-In/Right-Out (RIRO)		• Access concern for mobile home business and others
Option 2 (MUT): Spaulding Avenue Intscn 3/4 Access (RIROLI)	• Improved intersection safety • Provides access from State Street to side streets	• Limited access to main roadway from side streets • Access concern for mobile home business and others
Interstate 94 EB and WB Ramps (South Segment)		
Alternative B: Traditional Turn Lane Modifications	• Reduces queue length for EB left turn lanes	• No significant improvement to future intersection LOS
Alternative C: Partial Median U-Turn (MUT)	• Reduces queue length for EB left turn lanes • Improves LOS for upstream intersections • Improved safety at Interchange Avenue	• No significant improvement to future intersection LOS
Project No. SHE-1-083(119)088, PCN 20098		
Interstate Avenue (North Segment)		
Alternative B and C: Traditional Turn Lane Modifications and MUT Base Alternative: Flush Median	• Future intersection LOS C • Substantial improvement to WB left turn LOS • Fits within existing ROW	• No significant improvement to future intersection LOS
Alternative B and C: Traditional Turn Lane Modifications and MUT Option 1a: Raised Median	• Future intersection LOS C • Substantial improvement to WB left turn LOS • Improved safety on east approach	• EMS and business access concerns to/from N 13th Street • Accessibility from N 13th Street – uncontrolled access across adjacent businesses • Requires 0.003 acres of Permanent ROW (1 parcel with potential hazardous materials) • Relocation of north lot access approach • Winter maintenance around median • Higher cost than Base Alternative
Century Avenue (North Segment)		
Alternative B: Traditional Turn Lane Modifications	• Future intersection LOS D • Improves overall intersection delay from existing conditions	• East approach lanes reduced to 11 feet wide
Alternative C: Partial Median U-Turn (MUT)	• Future intersection LOS C • Improved intersection safety • Less delay than Alt B	• Require education campaign on traffic operational changes • Potential exists for left turn from main roadway

	• 30% less conflicts points than Alt B • Fits within existing ROW • Side street movements unchanged	• Some movements require rerouting and longer travel distance • Increased right turn / pedestrian crash potential • Side street right turns could collide with U-Turn vehicle • Additional traffic signal coordination and maintenance • East approach traffic lanes reduced to 11 feet wide • Higher cost than Alt B
Base Alternative: Single EB Left Turn Lane with Raised Median	• Same intersection LOS as Option 1b • Lower cost than Option 1b	• Slightly more overall intersection delay than dual EB left turn lanes in Option 1b • Increased queue length • Protected-Only left turn phasing • Negative offset with proposed dual WB left turn lane
Option 1b: Dual EB Left Turn Lane with Raised Median	• Slightly less overall intersection delay than Base Alternative • Decreased queue length	• West approach traffic lanes reduced to 10 feet wide • Protected-Only left turn phasing • Negative offset with proposed dual WB left turn lane • Right of way constraints Higher cost than Base Alternative
Weiss Avenue / Harvest Lane Intersection (North Segment)		
Alternative B and C: Traditional Turn Lane Modifications and Partial Median U-Turn (MUT)	• Improves future NB left and right turn LOS	• No improvement to future intersection LOS
Calgary Avenue Intersection (North Segment)		
Alternative B and C: Traditional Turn Lane Modifications and Partial Median U-Turn (MUT)	• Future intersection LOS C • Improves side street right turn LOS • Realigns west approach with east approach	• Requires 0.001 acres of Permanent ROW (1 parcel)
Project Nos. NHU-IM-1-083(133)901, PCN 22769 and NHU-IM-1-083(134)088, PCN 22770		
Concrete Pavement & Structure Repair (Divide Avenue to Calgary Avenue)		
Alternative D and E: Concrete Pavement & Structure Repair	• Extends pavement life • Extends structure life • Reduces annual maintenance costs	• Temporary impacts to motorists

Table 9 – Recommendations

	1. Do you concur with the project concepts as proposed?	2. Which alternative(s) should proceed with the project?													
		South Segment						North Segment							
				Alternative C					Alt B			Alternative C			
		Alt A	Alt B	Base Alt (Full)	Option 1 (RIRO)	Option 2 (RIROLI)	Alt D	Alt A	Base Alt	Option 1a (Interstate Ave)	Option 1b (Century Ave)	Base Alt	Option 1a (Interstate Ave)	Option 1b (Century Ave)	Alt E
Office of Project Development															
Office of Operations															
Bridge Division															
Construction Services Division															
Design Division															
Bismarck District															
Environmental & Transportation Services Division															
Local Government Division															
Maintenance Division															
Materials and Research Division															
Programming Division															
Planning/Asset Management Division															
City of Bismarck	X		X		x		X		X		X			x	X

X = City of Bismarck Recommendations

I. Executive Decisions

1. Do you concur with the project concepts as proposed?

X _____ Yes

_____ No

Project No. SHE-1-083(118)901, PCN 20097
Intersection Improvements
Divide Avenue to Interstate 94 EB and WB Ramps (South Segment)

2. Which alternative should proceed with the project?

_____ Alternative A – No-Build Alternative ($0)

X _____ Alternative B – Traditional Turn Lane Modifications ($2,885,816)

_____ Alternative C – Partial Median U-Turn (MUT) at Divide Avenue and Capitol Avenue

If Alternative C is selected, which improvement should proceed with the project at Spaulding Avenue Intersection? *(must select one)*

_____ Base Alternative: No Modifications (Full Access) ($4,187,184)

X _____ Option 1: Right-In / Right-Out Access (RIRO) ($4,457,159)

_____ Option 2: 3/4 Access (RIROLI) ($4,401,643)

Project No. SHE-1-083(119)088, PCN 20098
Intersection Improvements
Interstate Avenue to Calgary Avenue (North Segment)

3. Which alternative should proceed with the project?

_____ Alternative A – No-Build Alternative ($0)

X _____ Alternative B – Traditional Turn Lane Modifications ($3,582,396)

If Alternative B is selected, which improvement should proceed with the project for:

Interstate Avenue Intersection – East Approach? *(must select one)*

X _____ Base Alternative: Flush Median (Add $0)

_____ Option 1a: Raised Median (Add $116,145)

Century Avenue Intersection – West Approach? *(must select one)*

_____ Base Alternative: Single EB Left Turn Lane with Raised Median (Add $0)

X _____ Option 1b: Dual EB Left Turn Lane with Raised Median (Add $148,707)

X = City of Bismarck Recommendations

_____ Alternative C – Partial Median U-Turn (MUT) at Century Avenue ($4,699,005)

If Alternative C is selected, which improvement should proceed with the project for:

Interstate Avenue Intersection – East Approach? *(must select one)*

X _____ Base Alternative: Flush Median (Add $0)

_____ Option 1a: Raised Median (Add $116,145)

Century Avenue Intersection – West Approach? *(must select one)*

_____ Base Alternative: Single EB Left Turn Lane with Raised Median (Add $0)

X _____ Option 1b: Dual EB Left Turn Lane with Raised Median (Add $192,122)

Project No. NHU-IM-1-083(133)901, PCN 22769
Concrete Pavement & Structure Repair
Divide Avenue to Interstate 94 (South Segment)

4. Which alternative should proceed with the project?

_____ Alternative A – No-Build Alternative ($0)

X _____ Alternative D – Concrete Pavement & Structure Repair ($460,000)

Project No. NHU-IM-1-083(134)088, PCN 22770
Concrete Pavement & Structure Repair
Interstate 94 to Calgary Avenue (North Segment)

5. Which alternative should proceed with the project?

_____ Alternative A – No-Build Alternative ($0)

X _____ Alternative E – Concrete Pavement & Structure Repair ($335,000)

Amendments/Comments for Project Nos. SHE-1-083(118)901, SHE-1-083(119)088, NHU-IM-1-083(133)901, and NHU-IM-1-083(134)088:

Ronald J. Henke, P.E., Deputy Director for Engineering Date

II. Environmental Impact Checklist